THE MARINE REVIEW

VOL. 50 CLEVELAND JANUARY, 1920 NEW YORK No. 1

Would Send a Nation to School

Chairman Payne of Shipping Board Favors National Education in Marine Affairs While Government Continues to Operate the Ships

AMERICA'S hopes for a merchant marine can suffer unconsciously from the actions of its friends. In the same way misguided efforts of its enemies can bring about ultimate good. But the prospects for its friends making mistakes are better than the chances of considered plans of its opponents going astray.

These truisms are aroused because a man of silence as finally spoken. Earlier chairmen of the United States shipping board have not practiced the sphinx-like reticence which at long intervals distinguishes public officials. But John Barton Payne, head of the board for several months past, has been a noteworthy exception. He has not cultivated the Washington correspondents and his bent for economy soon brought about the dismissal of the feverishly active publicity organization of his predecessors. But he now makes public his views.

Would Educate a Nation

Briefly, Mr. Payne finds the American people unready to operate ships. He feels the federal obligation to educate the people to full maritime vigor. Sell the ships if any one insists upon buying them but prefer to operate the huge taxpayer-built fleet as an educational medium for the nation. Then after commencement exercises, turn over the fleet in some indefinite manner to these graduate students.

Mr. Payne says private ownership is the goal but the importance he apparently attaches to this utterance is the equal of a careless acknowledgement of an acquaintance's remarks about the weather.

In all truth, advocates of an American merchant marine can distinguish little difference between the results of garrotting by enemies or smothering by friends. The shipping board as the psychopathic ward where the untrained public can be nurtured in marine affairs would be a greater menace than a federal bureau openly for government ownership.

The problem today, Mr. Payne says, is not one of deciding between private and government ownership but a question of American or foreign control. Mr. Payne's statement, which is published in full on following pages, discloses his conviction that the shipping board and the taxpayers must support a plan for public education if foreign domination is to be prevented. To save the merchant marine apparently calls for the preservation of the innumerable federal jobs which the shipping board as a ship operator has at its disposal.

Politicians Are Not Ship Operators

Politics has been the evil genius of the merchant marine for years. Washington has been accustomed to giving either too little or too much attention to the health of American shipping companies. Since the armistice and with the railroad muddle freshly in mind, advocacy of a privately owned marine has been the rule at Washington. The trouble is that the results obtained and promised for the immediate future are of a different kind.

For the national good, the shipping board and the Emergency Fleet corporation should be deprived as quickly as possible of their powers to spend public money. England's government-built ships are now entirely in private hands. Various government departments boast of salvaging from 10 to 60 per cent of the cost of now useless war materials. A higher rate of salvage on shipping can be secured and until the armistice every one thought of ships only as war essentials.

The proposal to divide the country into districts, allot the entire fleet proportionately and put it up to each district to absorb its allotment, has some disadvantages and one overwhelming merit. It would remove at one stroke those functions which the shipping board was never intended to assume and would make the board a regulatory and advisory body instead of a misshapen business corporation. That merit is an overwhelming argument for the proposal or for any change which accomplishes the same result.

Digitized by Google

World Charter Market Reviewed by

BUNKERS LOW

Shortage due to the coal strike seriously affects steamers — Sailing vessels and oil burners in demand

ASSIGNMENT of passenger tonnage seized from the enemy during the world war to private operation in projected lines to South America and Europe, coincident with the announcement of many extensions of service by individual lines, overshadowed the pessimism created in ocean trading circles by the failure of the United States senate to ratify the peace treaty and thereby remove the final barrier to the resumption of international commerce. So long as the peace treaty is not ratified American consuls will not be sent to Germany and the irksome restrictions of the enemy trading act will remain. This situation dissuades American companies going ahead with their plans to extend their lines to former enemy ports.

The scarcity of coal, due to the recent strike in this country and the curtailed output in England, is bringing about serious results. The harbors of the United States have been congested and oil-burning ships and sailers have been in active demand. The shortage in tonnage has been felt keenly and in some ports of the world there has been an active bidding for space. This was particularly true of Buenos Aires, from which port rates temporarily advanced.

Alfred E. Clegg, vice president, and Kermit Roosevelt, secretary, of the American Ship & Commerce Corp., sailed for South America last month. It was assumed that their intent was to survey the field in the interest of the Kerr line. The Kerr interests were apparently not remembered by the shipping board in its distribution of the captured passenger vessels, as it has been agreed that the Munson line shall operate the South American service, while the American line will handle the LEVIATHAN and other big ships in the European runs.

Assign Ex-German Vessels

The Munson line will send the MOCASSIN to South America in December. She will be followed by the CALLOA a month later. The HURON, AEOLUS, DEKALB, PRINCESS MATOIKA and the POCAHONTAS will follow. The schedule is for these vessels to stop at St. Thomas for bunker after leaving New York, thence to Santos, making Buenos Aires the southern terminal. They will return over the same route. There will be a sailing every two weeks. The American line will operate the LEVIATHAN to northern European ports. While other allocations have not been named, it is presumed that this line will also have charge of the other big passenger ships allocated to the European trade. Phelps Bros. will have the SUSQUEHANNA to operate in the Mediterranean trade. The cost of converting these ships from troopers to commercial passengers will be tremendous. It has been estimated that at least $5,000,000 will be spent to put the LEVIATHAN in condition.

Another ex-German ship, the huge IMPERATOR, was handed back to England and turned over to the Cunard line. Six more enemy vessels are still being held pending a decision of the allied council in regard to the disposition of the German tankers owned by the Standard Oil Co. Practically all of the ex-enemy tonnage has been used in troop movements and not only must considerable money be spent but it will require a long time to recondition them for commercial uses. The new services, therefore, will be some time in their establishment.

In the meantime, the shipping board easily dominates shipping under the American flag. The board has added more than 1400 freighters to the merchant marine, and through allocation to private operating agents is carrying on business with the ports of Greece, Finland, Turkey, China, Japan and the Philippines, as well as Europe and South America. The board has inaugurated the Windward Islands line with the sending of the LAKE GILTEDGE from Mobile to Guadeloupe, Martinique, British West Indies and Trinidad. Three more steamers will be added to this route when they will make Cuban, Haitian, Jamaican, Dominican Republic, and Puerto Rican ports.

Private Companies Active

By establishing foreign agencies, the shipping board expects to entrench more permanently the American merchant marine in foreign fields. E. C. Tobey is the London agent and it is said that extensions of this service will be spread to Riga, Windau and Libau. Should this Baltic route be expanded an easy access for American goods in Russia will be had. The first private American agency to be opened in England has been establshed at London and Liverpool by the J. H. W. Steel Co. This company has at present about 40 ships under its management but expects to extend that number shortly. Privately owned American shipping has been active. The International Mercantile Marine, which owns the American line, has decided to establish a direct passenger service between New York and Hamburg with the MONGOLIA. The British subsidiary of this company, the Red Star line, has re-established its passenger service from New York to Antwerp. This line has

Orders Tankers

HAVING extended its control to 60 steamers, the A. G. W. I. today has the largest single fleet that is operated under the American flag. This company has in the past been identified with the coastwise and West Indian trade but plans are now under way which will undoubtedly place some of its vessels in European service. The company purchased extensive oil lands in Mexico recently and is now building a pipe line for its product. This property will take the A. G. W. I. into the oil trade and for this purpose a contract for 10 tankers was recently let. These vessels will have a combined deadweight tonnage of more than 120,000.

Digitized by Google

Experts in This Country and Abroad

IMPORTS GROW

Vessels bring back full cargoes from Germany—Many new lines organized—Pacific trade remains active

been operating a freight service on the Antwerp run ever since soon after the armistice. W. R. Grace & Co. have offered a new bond issue for steamship extensions, announcing their intention of acquiring 33,000 more tons of ships. The Grace line has already let a contract for a 10,000-ton tanker to be operated in the South American trade. This line will most likely acquire four vessels from the shipping board, these vessels having originally been planned by the Grace line but requisitioned on the ways.

The United States Transport Co., which is to operate the ships belonging to the United States Steamship Co., has created considerable gossip in the market. Charles W. Morse heads the line, and it is reputed that the company has the backing of some rather large interests. Among those said to be associated are Thomas F. Ryan, George J. Whelan and James B. Duke. For the present the company will operate no regular service, but will use its seven ships as tramps. The principal ports will be New York and Baltimore, with occasional services from Philadelphia. They will operate to the French north Atlantic ports and to points on the Mediterranean. The line is understood to have a valuable coal transportation contract with the French.

Inaugurate New Offshore Lines

A new line, the Inter-Coast Steamship Co., has just opened offices in Boston. The line begins with six steamers in the offshore trade. The Black Diamond Steamship Corp. has been formed to take over the agency of the Union Suisse de Transports Maritimes and will operate the latter's vessels in a regular bimonthly general cargo service from New York to Antwerp and Genoa. The Seager Steamship Co. has succeeded the Seager Trading Co. as the operator of the Seager line. This line proposes substantial increases in its sailings from New York to ports of Norway and Denmark. The George H. Wells Steamship Corp., which has been booking freight from New York to Manchester, will probably be given a permanent berth in the Manchester service. The company operates shipping board vessels. The Brooks Steamship Corp., which came into existence when it acquired a number of wooden vessels from the shipping board, expects shortly to place a number of steel steamers on berth. The Kerr line proposes to establish a service from Philadelphia to Hamburg direct, taking over the trade formerly held by the Hamburg-American line. The Elder Dempster Co. has brought the NEW MEXICO into Philadelphia from the west coast of Africa. This has been advertised as the initiation of a new service from the gold coast.

One of the causes attributed to the prevailing high ocean freight rates is the fact that few return cargoes are available. It was therefore noted with considerable gratification by shipping people last month that several full cargoes were brought back from Germany. The ABRAHAM LINCOLN, operated by the United States Navigation Co., brought 6800 tons of general merchandise from Hamburg to New York, following the arrival of the SACRAMENTO, a ship of the same line, with 3800 tons of German goods. The Holland-American liner, NIEUW AMSTERDAM, brought in a consignment of German dyes.

Steamship interests, nevertheless, contend that the high freights are justified on the following scores: (1) Relative shortage of tonnage because of the failure to make good the world losses sustained during the war, and the large number of vessels still being "conditioned" after the stress and strain of war service. (2) Post-war European governmental needs in the matter of transport and labor delays generally. (3) Greatly increased cost of ships, and higher insurance values as a result. (4) High cost of repairs and maintenance. (5) Increased wages for officers and seamen and heavier bills for their food and ships' stores. (6) Higher dock dues. (7) Higher prices for bunker coal.

Grain Chartering is Active

The British have succeeded in keeping enough ships under governmental control to import American and Canadian wheat, and a formidable fleet is expected to arrive immediately in the north Atlantic to load grain for the United Kingdom. There has also been some chartering of grain carriers on this side and several fixtures have been effected from St. John or Halifax at 10s per quarter for heavy grain and 57s 6d per ton for wheat. Most of the steamers were chartered with the option of loading at 9s 3d for wheat at Portland, Me., while 53s 9d per ton will be paid for flour when the boats are loaded at the latter port. A steamer was taken from the Northern Range to the French Atlantic at 14s, while from gulf ports 19s was paid to West Italy, both heavy grade.

On the net form of charter the latest report indicates that the market is more or less weak. There was some interest displayed in tonnage for carrying

Unassembled Ships

THE Submarine Boat Corp. has orders for four "unassembled" ships recently given to Vice President Sutphen of the corporation while on a business visit to Italy. The company could have taken more orders but owing to lack of credits, it was necessary to conduct business on a cash basis. These vessels will be assembled in Italy by Italian workmen. The corporation is to make the parts and ship them to Italy on Italian vessels. Drawings will also be sent. Italy is short of coal and machinery which handicaps her ship industry. However, she has plenty of skilled workmen who can put the ship parts together.

Digitized by Google

coal from the United States to European destinations, and rates ran from $22.50 to $23.50, Virginia to Rotterdam, or $25, with Hamburg option, while $23.50 to $24.50 was an offer to the French Atlantic ports, with $26 to $27 to west Italy, $31 to $32 to Venice and Trieste and about $32 to Piraeus. The firmness displayed in the Plate market has been reflected in tonnage loading at the nitrate ports. A small steamer was closed for west Italy at 245s, the position being December-January. To the Antwerp-Dunkirk range 230s was paid, and 235s to 240s could be had to Spain. Sulphur from Sabine was done at $30 per sailer to Cette. Tonnage was wanted for cotton at 220c, Savannah to United Kingdom at Form 0.

Pacific Market is Firm

The north Pacific charter market continues firm and steady. There is an insistent demand for lumber tonnage and an inadequate number of vessels to handle the cargoes offering. Shippers are experiencing difficulty in moving their business and as a consequence vessels are being chartered as promptly as they are available. Freights are firm and high. Inquiries for north Pacific lumber are being received in volume from every available market and the prospects are that an unprecedented amount of lumber will be exported during the coming year, the shipments being limited only by the number of carriers which can be obtained.

A reflection of the situation is shown in the increased number of wooden hulls now being sold by the shipping board. Recently several hulls have been purchased by private interests. A majority of these will be rigged as sailing vessels and placed in the offshore lumber trade. Australia, South Africa, the United Kingdom and Europe are calling insistently for north Pacific lumber but the paucity of carrying capacity is hampering exports greatly.

Vessels Hard to Obtain

The market to the west coast of South America has improved greatly and to the Orient there is also a strong demand. One Seattle firm alone is seeking space for 137,000,000 feet of lumber and another company is searching the market for a dozen or more vessels to take lumber to various offshore points. Owners and operators have no difficulty in placing their vessels at going freights or better.

On the Oriental route, business conditions are becoming rapidly adjusted and while cargoes are not moving in the volume of war time, there is a brisk trade with China, Japan and the Philippines. As an indication of this, all the lines report their vessels booked full westbound until February. Flour, formerly a large item of export, is beginning to move again to the Orient in limited quantity. The principal market at present is in the Philippines.

Boston's Exports Fall Off

The strike of tugboat engineers at Boston came to an end fortunately just when the coal strike started and thus made it possible for large shipments to be made by water from the southern coal mines which were least affected by the labor trouble. The export business during the past month has fallen off some, due in part to the labor difficulties in this country and the accompanying loss in production of steel and steel products. In spite of this, imports have continued heavy and shipbuilding all along the coast has been unusually active. The yards in Maine almost without exception have launched a greater tonnage during the last few months than during the same months in 1917 and 1918. The Charlestown navy yard offered several old government vessels at auction recently and obtained discouragingly low bids but this reflected in no way on the demand for bottoms as the boats offered were all small. Many new steamship lines have been started and new companies have been formed to engage in export and import business.

New Lines Slated for Portland

Two new freighters of 1000 tons capacity, each, have been added to the service between Boston and Halifax, N. S., by the Nova Scotia Steamships, Ltd. Announcement is made that several new lines will be started at the opening of the 1920 season between Portland, Me., and England. Sailings have started on the Holland-American line between Boston and Rotterdam and regular prewar service is expected soon. Exports have consisted principally of shoes, meat, apples, grain, machinery and cotton goods and imports while exceptionally heavy in hides and skins have otherwise been of a miscellaneous nature. Among these have been fruit, dyes, lumber and steel.

Demand for charters to Italy, India and South America has been fair but in some cases vessels unloading at Boston from Africa have had to proceed to New York to obtain full return cargoes. Fuel ships have been given preference over all others in the government dry docks and repair yards and this in some cases is delaying deep water vessels.

Irregular Rates in European Markets

(From Our European Representative)

LONDON, Dec. 10.—(By cable)—Chartering conditions in the North Atlantic are quiet with British operators fearing further vessel detentions due to the American bunkering embargo. Rates from the River Plate to the United Kingdom are irregular, the lowest February fixtures being 143s. From the River Plate to Antwerp, the rate quoted is 190s but vessel owners are demanding 210s. Indian chartering conditions are languishing as there is but litle business in sight. The rate from Bombay to the United Kingdom is 100s. A fair movement of iron ore from Spain to the United Kingdom is reported at 25s. Ports throughout Great Britain are tremendously congested with freight, London being especially hard hit. There is a great demand for old steamers in fact anything that can float seems to be in demand. In some recent sales, 11-year-old vessels brought £23 a ton.

Digitized by Google

Trial Trip of Gas-Electric Boat

Trawler Equipped With Diesel-electric Drive Proves to be Easily Controlled — Valuable Test of Commercial Uses of New Method of Propulsion

BY HERBERT R. SIMONDS

MANY theoretical advantages in electrically driven ships have long been acknowledged, but the practical operation of such a ship has been the matter of conjecture only. Up to the present time, as far as is known, but one commercial vessel above the launch or power boat size has ever been put into service equipped with an electric drive. This vessel was built when electric and internal combustion engine design had not advanced as far as is now the case.

The construction of the new trawler MARINER has, therefore, been watched with unusual interest and its trial trip at New London, Conn., recently, was the occasion of considerable comment on the part of electrical and marine engineers who have been intimately concerned with the vessel's power plant development. The General Electric Co., Schenectady, N. Y., and the New London Ship & Engine Co., Groton, Conn., combined their efforts to make this first example of the crude oil engine-electrically driven vessel a success.

A preliminary description of the vessel was presented in THE MARINE REVIEW, November, 1918. Fred L. Davis, Gloucester, Mass., who is the principal owner of the new boat, acted as host to the group which took the trip. Captain Cable, general manager of the New London Ship & Engine Co., acted as captain, and W. H. Wild of the marine engineering department of the General Electric Co., took charge of the electrical end of the ship's power plant. Other General Electric Co. men from Schenectady and Boston were on hand together with several engineers from the New London Ship & Engine Co.'s plant.

Previous to the day of the trial, the two diesel engines were tuned up and put in final working order, so that at the trial they were started without difficulty and both ran smoothly. After the engines had started, each with its direct-connected electric generator, the dock lines were taken in and the whistle was blown announcing the start. Up in the pilot house, a man stood at the handle of a street car type controller and watched a row of meters conveniently placed to starboard. A gradual movement of the controller handle built up the field current in the 400-horsepower motor directly connected to the propeller shaft. Further movement of the handle brought the electric current across the main motor terminals and the propeller started to revolve. Slowly and quietly the boat moved away from the dock and gained speed as the operator, by further movement of the controller, cut down the resistance in circuit.

Tests Were Successful

The test was in every way highly successful. The motor was run at half speed for several miles and then at full speed out into the rough water at the head of Long Island sound. The arrangement of the power plant is such that the main motor may be driven by either of the two generators or by both at once. The normal operation is using both generators, single generator operation being only necessary in case of a breakdown or when desiring to run for long intervals at slow speed. Tests were made under all conditions, and the boat's behavior came up to the engineers' expectation. It is in maneuvering a vessel such as the MARINER that the greatest advantage of electric control is developed.

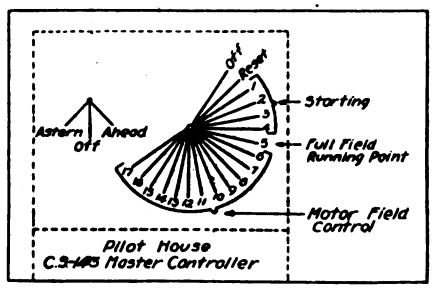


FIG. 1—HOW THE CONTROLLER OPERATES

At docking on the return from the test, the propeller was reversed 15 times in approximately four minutes, and with the rudder set the boat was eased up to the side of the wharf almost as if it had been a small launch.

Although the full details concerning the boat's power equipment have not yet been prepared by the manufacturers, a brief account of the plant's operation may be of interest. The diesel engines are started by compressed air stored in auxiliary tanks for the purpose. To guard against the depletion of this supply of air, there is a small auxiliary engine generator set which may be used to drive an auxiliary air compressor This set may also be used to furnish lights when the main generator is not running. The engines and their direct-connected generators rotate at 370 revolutions a minute, and drive the motor at a speed of approximately 200 revolutions a minute.

Controlled circuits have been run to the pilot house as well as to a convenient point in the engine room so that it is possible for the ship to be maneuvered either in the old way by means of signals from the pilot house to the engine room or in the new way which consists of control of the propeller direct from the pilot house itself. This direct control is so simple in operation that it is easy to overlook the technical detail which has made it possible. In reversing the motor it is necessary to keep the field excited, for otherwise the time lost in building up the field between forward and astern operation would be so great as to defeat one of the principal advantages of electric drive. This is taken care of in the wiring of the drum type master controller.

The detailed operation of this controller is shown in Fig. 1 while Fig. 2 shows the motor circuits. From the off position the lever is moved across a reset position and the four starting points to the full field running point. From here on, the speed control is accomplished by cutting in resistance circuits in parellel in the motor field circuit, thus reducing the total resistance effect. Any speed from point 5 on to 17 may be continued indefinitely without overheating the resistance grids. To reverse the motor, the lever is thrown back to the reset position. At this position, there is a stop which prevents further movement of the lever unless a thumb release is operated. At the reset position the motor field is still in circuit and the overload relay is here picked up in case it had been tripped out in operation. After the

Digitized by Google

lever has been thrown back to this point, the small auxiliary switch is then thrown into the astern position and the lever moved forward to start the motor in its reverse direction in the same manner as before for going ahead.

The meters of the engine room are duplicated in the pilot house so that it is possible for the operator to tell the load on either of the generators, and the excitation of the motor field, as well as the generator voltage. In the trial trip reversals of the propeller were made in about five seconds from slow speed ahead to slow speed astern. With such quick reversing capacity, it is possible to set the rudder hard astarboard or hard aport and to practically revolve the boat about its bow, much the same way as a spoke revolves about its hub.

After a few finishing touches the MARINER will make the run to its home port at Gloucester, Mass., and soon after will be put into its regular service of trawler fishing. One of the engineers from the General Electric Co. will remain with the boat for a week or more until those who are to operate it become thoroughly familiar with the equipment. Exact figures as to comparative costs of the diesel engine electric drive and the steam drive which has heretofore been the power of fishing trawlers have not been compiled. However, the diesel engine equipment for the MARINER comes to approximately $100 per horsepower, installed, and the electrical equipment adds about $35 per horsepower to this figure.

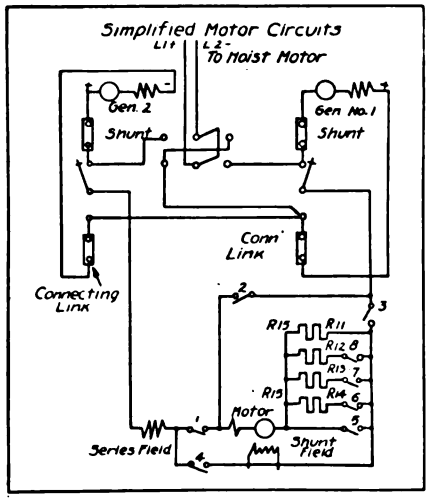


FIG. 2—ARRANGEMENT OF MOTOR CIRCUITS

An auxiliary 100 horsepower motor will be used for driving the winches for hawling in the fish. This extra service required in a trawler as well as the fact that continued slow speed is required during the actual fishing operation was a determining reason for adopting the electrically propelled boat for this class of service. However, to anyone who has seen a boat of the size of the MARINER maneuvered simply, easily and rapidly, merely by the turn of a small handle in the pilot house, it will be hard to believe that some form of electric drive will not be developed for commercial vessels of larger size for use on regular trade routes.

Why England Secured the Imperator

TURNING over to Great Britain of the steamship IMPERATOR by the United States shipping board was done in accordance with the agreement reached by the allied maritime conference. This vessel, 51,969 tons gross, exceeded in capacity only by the LEVIATHAN, turned over originally to the United States along with other ships in German ports for the repatriation of American troops and was taken over on a food exchange basis. At the request of the President, for peace conference purposes, an office was established in Paris by former Chairman Edward N. Hurley of the shipping board in December, 1918. The vice chairman of the shipping board, with other representatives of the United States, presented the views of this country at a conference in Brussels relative to the supply of food to the Germans, taking over of German ships, and the revictualing of Europe. The shipping board representatives also acted on the reparation commission and the subcommittee on navigation.

After the transporting of troops from France had been completed, and following some discussion between the two governments, the IMPERATOR was turned over to Great Britain, and disposal of the remaining ships taken from German ports remains with the terms of the treaty. These other ships, now in American waters, include the CAP FINESTEERE, 14,503 gross tons; GRAF WALDERSEE, freighter, 13,079 deadweight tons; MOBILE (ex CLEVELAND), 16,960 gross tons; PRETORIA, 13,234 gross tons; PRINZ FRIEDRICH WILHELM, 17,082 gross tons, and ZEPPELIN, 14,167 gross tons. Germany is to get credit under the treaty for all ships taken from her, both those which were in her ports and those interned in ports of her enemies, these properties applying as part payment for her obligations under the peace terms.

Dispute Remains Unsettled

In view of the action taken by the allied maritime commission in allocating for the use of Great Britain the 10 Standard Oil tankers which were in German ports, action taken without apparent approval by any representatives of this government, a dispute over these vessels remains unsettled. The action in turning these tankers over to Great Britain is held to have been unjustified. While apparently these tankers were the property of German interests, as a matter of fact the prize court that acted upon the case involving the seizure of one of these tankers during the war held that the controlling corporation was the Standard Oil Co. While no shipping board official will be quoted in this matter, there is a well founded belief in both official and shipping circles that if the tankers are turned over to the United States, along with the other ships taken from German ports of the which the IMPERATOR was one, no obstacle will be placed in the way of officials giving the latter ships over to the conference. This would leave the IMPERATOR in the hands of Great Britain without any objection. It is believed that negotiations to this end have been unofficially made with Great Britain and are unofficially acceptable to that government, and that this was the first condition upon which the IMPERATOR was awarded to Great Britain. The United States will, of course, retain the German and Austrian ships which were interned in American ports. They numbered 105, aggregating 662,513 gross tons, 91 of them being German and 14 Austrian ships.

Lost 61 Submarines

In considering British submarine losses, an article in *Blackwoods Magazine* points out that most of the casualties were due to striking mines. Losses through direct contact with the enemy were infrequent. In all, 61 submarines were lost as follows: Blown up, 7; from unknown causes, 20; sunk by enemy craft, 5; sunk by gunfire, 5; sunk by mines on British coast, 4; shipwrecked, 5; sunk by air bombs, 2; sunk by collision, 7; sunk by British error, 3; internal explosion, 1; sunk in harbor, 1; sunk in trial, 1.

According to the *Neues Pester Journal*, negotiations are being carried on between German and Rumanian merchants and the Hungarian government concerning a scheme to transport petroleum oil from Rumania over the inland waterways into Germany.

Digitized by Google

Are Supercargoes a Necessity?

Business Agents of American Cargo Vessels Meet Considerable Opposition — Schedule of Duties They Perform

BY V. G. IDEN

AT A cost exceeding $150,000 per month, the United States shipping board undertook to restore to the seas a group of employes —supercargoes—which private steamship companies generally abandoned as needless many years ago. Supercargoes are not new to the American merchant marine by any means. Keen competition between shipping lines was probably the cause of doing away with them in the past, although better business organization of the lines operating ships proved that supercargoes were unessential. The supercargo is the business agent of the ship. His services were undoubtedly extremely valuable when a vessel roamed the sea at will, picking up a cargo here and another there, earning freight money the best it could. Organization, however, changed that speedily and the steamship companies established regular lines with regular sailings and with agents in each port of call who could look after all the essential business matters which the supercargoes previously attended to.

The port agent was probably more efficient than the old supercargo because he was constantly on hand when his line's ships were in or out of port. He could arrange for the accumulation of a cargo on time to load a vessel without delay when she did reach port. This work, the supercargo could attend to only when the vessel had arrived and he was able to go ashore.

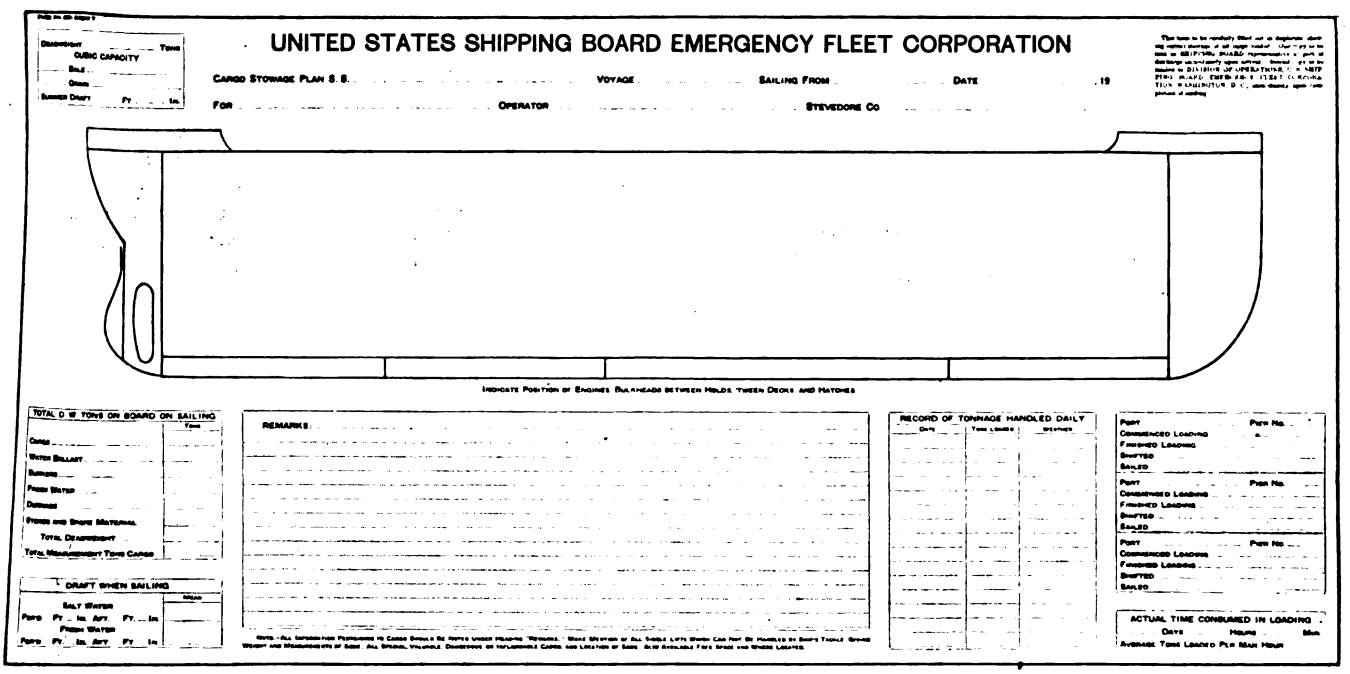
No More Supercargoes To Be Employed

CHAIRMAN PAYNE, of the shipping board, has decided that no more supercargoes shall be taken on by the board. It is planned that no supercargoes shall be employed on vessels that are managed and operated by companies that have proved themselves efficient, and who are experienced in handling ships. No supercargoes shall be employed on vessels bound for ports where the shipping board has an agency. The board undoubtedly will continue to make use of its supercargoes in undeveloped trade routes and on vessels bound for ports where there is no shipping board agency.

In re-establishing the position of supercargo the United States shipping board aroused some unmistakable hostility among many mariners. The seaman is inclined to consider the young business agent of the government an interference and a "spy." There has probably been some animosity in the criticism of the supercargo service and on the other hand there has been considerable buncombe in the arguments presented in the defense of that service.

On Nov. 1, the shipping board had approximately 800 supercargoes in its service. These men were of an average age of 30 years, the maximum age being 34 and the minimum 21 years. Many of them were college men and a great number came from the middle west without the least knowledge of the business of merchant navigation. They are all paid the fixed wage of $175 a month with an allowance of $5 per day for sustenance when they leave the ship on business.

Officially it is declared that the value of supercargoes comes from the fact that they are the "trade commissioners" of the government. Their value in this regard is much in question as judged from the reports on trade conditions in foreign countries which the supercargoes have furnished.


UNITED STATES SHIPPING BOARD EMERGENCY FLEET CORPORATION

CARGO STOWAGE PLAN S. S. ... VOYAGE ... SAILING FROM ... DATE ... 19

FOR ... OPERATOR ... STEVEDORE CO ...

REMARKS

RECORD OF TONNAGE HANDLED DAILY

ACTUAL TIME CONSUMED IN LOADING

FORM FILLED OUT BY SUPERCARGO SHOWING CORRECT STOWAGE OF ALL CARGO LOADED—ONE COPY IS SENT TO THE SHIPPING BOARD REPRESENTATIVE AT PORT OF DISCHARGE IMMEDIATELY ON ARRIVAL WHILE ANOTHER COPY IS FORWARDED TO THE SHIPPING BOARD AT WASHINGTON

Digitized by Google

The shipping board prides itself on the rapid turn-over of the government vessels since the supercargo service was inaugurated and in many cases that pride is justified. One supercargo is attributed with saving approximately $40,000 on one voyage on one ship. By experience, the shipping board officials have been able to estimate with considerable accuracy just how long it should take to load or unload a particular vessel. Charters are now sometimes made upon a demurrage basis of $1 per net registered ton per day after a fixed free time. One day is allowed for clearing a port. A shipping board vessel loaded 4500 tons of pit props in Finland in four days. It took this ship 15 days to discharge these pit props at Port Talbot, Wales. As a result the shippers were compelled to pay a demurrage of $30,000. In this instance there were labor difficulties in Wales and the managers of the vessel were really not at fault.

The supercargoes are expected to aid in every manner to effect a quick turn-around of the vessel. He must do all in his power to see that sufficient labor is quickly supplied for loading and unloading, and must make himself familiar with the ballast and fuel requirements of his ship. When a thousand tons of coal or 100 barrels of oil for bunker are purchased in a foreign port, the supercargo must make certain that the full amount is delivered.

The supercargo is expected to sign and accomplish all bills for expenditure on fuel, provisions or ballast. He is expected to report direct to Washington all matters relating to port facilities and economic and trade conditions abroad. Likewise, he is called upon to report on the working of the vessel, cargo and bunker, a copy of which report is sent to the operators. Five copies of his report on loading and discharging are made up, one going to the operator, two to the division of operations at Washington, one to the district representative of the shipping board, and one placed on the ship's file. In addition the supercargo makes up a summary or port report. He executes all ship's papers, pay rolls, etc., in this assisting the captain.

The supercargo makes out a stowage report, a copy of which is given to the consignee of the cargo. He makes out a drydock report, voyage and condition report, physical data report, and a master sheet which gives all particulars regarding the vessel. If the supercargo finds time hanging heavily on his hands after making out all these documents and reports, he can busy himself when in port in studying trade conditions, locating return freight for his ship, interviewing consuls, ambassadors, merchants and shippers.

The supercargo service was started in the spring of 1919. All passenger lines carry pursers. They are nothing more than supercargoes on passenger vessels. Many small steamship lines have always carried supercargoes on their own vessels, and it has been a general practice to place supercargoes on chartered vessels. Practically the only thing novel about the government's supercargo service is its magnitude.

The supercargo is subject to the master's authority in all matters relating to the safety of the ship or cargo, but in no other way. As the representative of the government he is expected to see that the government's interests in all matters are properly handled. In the event they are not, the supercargo takes the matter up with the head of the deck or the engine department.

Must Hold Frequent Consultations

The supercargo is instructed to consult with the master, chief officer and agent, and ascertain the class and quantity of cargo to be loaded, the order of loading, berths and ports, cargoes to be loaded at each, and order of ports of discharge, and make up a preliminary stowage plan, or agree with the master and the chief officer how cargo is to be stowed, always taking into consideration the vessel's gear, the number and size of hatches, capacity of holds, trim, stability, and dispatch. The matter of dispatch is impressed upon the supercargo as being of utmost importance.

He is required to take up with the captain, engineer and agent, the matter of bunkers required for the voyage, and check up the chief engineer's figures, as to the consumption of coal or other fuel, both for steaming and lay days, and to satisfy himself that the amount is sufficient for

Form No. sis super. Report No.

DIVISION OF OPERATIONS
UNITED STATES SHIPPING BOARD EMERGENCY FLEET CORPORATION
WASHINGTON

SUPERCARGO'S REPORT

Steamer Voy. Manager

Port Date Operator

INWARD	OUTWARD
Bunker Coal—Tons Fuel Oil—Bbls.	Bunker Coal—Tons Fuel Oil—Bbls.
Dunnage and Stores Water Ballast—Tons	Dunnage and Stores Water Ballast—Tons
Fresh Water—Tons	Fresh Water—Tons
Cargo—Tons { Wgt. and/or Meas.	Cargo—Tons { Wgt. and/or Meas.
Space. Amount and Location Draft—Fwd. Aft.	Space. Amount and Location Draft—Fwd. Aft.
DISCHARGING	**LOADING**
Commenced	Commenced
Finished	Finished
Lost time hours mins.	Lost time hours mins.
Actual working time hours mins.	Actual working time hours mins.
Total tons	Total tons
Average per gang per hour	Average per gang per hour

RECAPITULATION CARGO

DISCHARGED

MANIFEST	DISCHARGED	OVER	SHORT	DAMAGED	REMARKS
pkgs.	pkgs.	pkgs.	pkgs.	pkgs.	
pkgs.	pkgs.	pkgs.	pkgs.	pkgs.	

LOADED

PACKAGES	COMMODITY	WEIGHT MEAS.	DESTINATION	REMARKS

FIRST PAGE OF 4-PAGE SUPERCARGOES' REPORT FOR LOADING AND DISCHARGING DATA

Digitized by Google

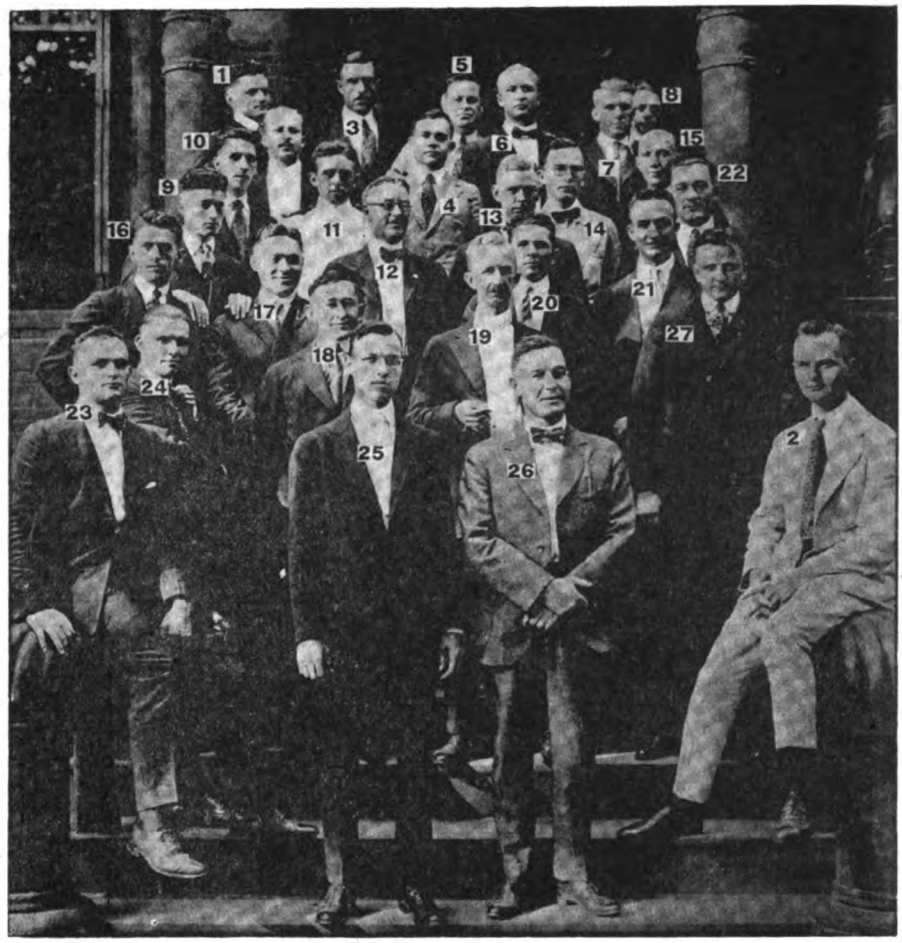
the voyage, with whatever spare bunkers are necessary. Any matters of excess or insufficient bunkers should be taken up with the chief engineer or agent, pointing out the discrepancies, and requesting that the supercargo figures be checked, and if found in order, they be guided accordingly.

The chief engineer is responsible for the bunkering of the vessel, particularly the quality and quantity, but this does not relieve the supercargo of the responsibility of protecting the government's interests in the matter. The chief engineer is expected to satisfy the supercargo that he has received the quantity and grade of coal or fuel oil that the contract agreement calls for. The supercargo is instructed to satisfy himself as to the quality and quantity, and if he is in doubt to have samples taken, and an analysis sworn to. He is then to notify the agent in writing in the event that bunkers are not to grade, the result of analysis and instruct the agent to adjust the matter with the supplier if possible, or, in order not to delay the vessel, bills will be paid under protest.

Prepares for Bunkering

Whenever a vessel is to bunker, preparations are expected to be made to begin the operation immediately the vessel is alongside of bunkers, or barges come alongside. These preparations are to be made under the supervision of the chief engineer and chief officer, but it is the duty of the supercargo to see that arrangements have been made, and that they are being carried out with the view of giving dispatch. Checking the amount of bunkers is important, and the chief engineer should give this matter his particular attention. There are different systems of coaling, and the supercargo can agree with the chief engineer on the most practical, quickest and the most accurate method to suit the occasion. When taking fuel oil, sounding of the ship and on board barge tanks should be made by the chief engineer before and after bunkering, and work back against the scale to ascertain quantity. The supercargo is to check these figures. The chief engineer must be satisfied with the quality and quantity of the bunkers and sign the receipts and approve the bills before they are approved by the supercargo.

Manifests, copies of bills of lading, bills of health, copies of stowage plan, etc., are handed the supercargo by the master or agent, and the supercargo is expected to check them over and be sure that he has all necessary documents for the voyage before sailing. Enroute the supercargo prepares the proper number of forms of manifests, crew lists and other documents as may be required for consignee's mail, etc.



THESE MEN FROM ALL PARTS OF THE COUNTRY ARE SUPERCARGOES ON SHIPPING BOARD VESSELS

1—Elmer C. Alford, Osyka, Miss. 2—G. O. Browning, Scranton, Pa. 3—R. G. Shaw Jr., San Francisco. 4—James H. Roper, McColl, S. C. 5—C. F. Kirby. 6—Edward Y. Davidson Jr. 7—Joseph M. Poulnot, Charleston, S. C. 8—Gordon F. Cheif, Seattle. 9—Vance S. Barden. 10—Victor Kerney. 11—R. N. Miller, Huntsville, Ala. 12—Charles S. Newlin, Philadelphia. 13—Kenneth W. Cugle, Washington. 14—Thomas H. H. Friend, Morgantown, W. Va. 15—A. M. Clapps, Washington. 16—Hugh R. Minter, Laurens, S. C. 17—Calvin E. White, Goodwater, Ala. 18—Fred H. Haynie, Auburn, Ala. 19—A. Y. Bradley. 20—N. A. Anderson, Roswell, N. M. 21—George G. Steele, Pittston, Pa. 22—George G. Lester, Humansville, Mo. 23—Frederick C. Dezendorf Jr., Berkeley, Cal. 24—J. B. Harper, Houston, Tex. 25—Frank Moletar, Seattle. 26—Capt. George S. White, chief of the shipping board's supercargo section. 27—M. A. Dunn, Meadville, Mo.

Prior to arrival, the supercargo is expected to consult with the master, and between them make up a wireless message to the agents giving the expected hour of arrival, number of tons of cargo, and class for discharge, stowage of same, advising number of tons and class in each hold, also order in which the same is available for discharge. The supercargo is expected to ascertain where the vessel will dock and whether she will make a starboard or port landing. If one or more tugs are required for docking, he will instruct the agent to have them alongside at the required time. He will advise the number of gangs of stevedores that can be worked, and request that they be alongside ready to commence discharge. As soon as docking orders are received they are to be transmitted to the chief officer, who, prior to arrival, will arrange to have derricks topped for port or starboard landing as the case may be, hatches taken off when weather permits and there are no port regulations restricting such practice, sufficient slings placed at each hatch, lighter ropes in place if cargo is to be placed in lighters, and in fact have everything in readiness to commence discharge without delay.

On arrival, the supercargo will confer with the master and the agent as to the working of the vessel, that is, the number of gangs to be worked, what hatches to give preference to, whether to work overtime, and if so, what hatches and the number of hours each is to be worked. The supercargo is expected to determine upon the most expeditious and the most economical manner of unloading and for the delivery of cargo. He is to get receipts for all cargo dis-

Digitized by Google

WORKING LOG

DISCHARGING

DATE	HATCH	NUMBER OF MEN	NUMBER OF GANGS	COMMENCED WORK	KNOCKED OFF	HOURS S. T.	HOURS O. T	TONS HANDLED	COMMODITY	REMARKS

LOADING

DATE	HATCH	NUMBER OF MEN	NUMBER OF GANGS	COMMENCED WORK	KNOCKED OFF	HOURS S. T.	HOURS O. T.	TONS HANDLED	COMMODITY	DESTINATION

REMARKS

Explanation of all Over, Short, and Damaged Cargo.
Over Carried Cargo and Disposition of Same.
Errors and/or Omission on Manifest.
All other Points of Interest about the Port and Working Facilities.

EXTRA MEAL REPORT

	LUNCHES	FULL MEALS	REASON FOR SERVING MEALS
Crew			
Others			
Total,			

SHIP'S OVERTIME

ENGINEERS	DONKEYMEN	FIREMEN	OFFICERS	SAILORS	COOKS, ETC.

PORT ITINERARY

DATE	HOUR	MOVEMENT

Give here a complete record of every move of vessel while in port. Show time of arrival at Quarantine and Dock. If any tugs used to Dock, give name or names and show time same were employed. If any repairs made, show date started and completed. Show delays with reasons for same. Also show where one voyage ends and the next begins.

This report to cover one port only, both Foreign and Domestic. Copies as follows: Original—Operators, two copies—Division of Operations, Washington, D. C., one copy—District Representative, Division of Operations, Port of Entrance, U. S., one copy—Steamer Files. On vessels calling at U. K. and European ports (north of, but not including, Gibraltar) and Baltic Sea ports, a copy is to be mailed to Special Representative, Division of Operations, U. S. S. B., Ship Mission, London, E. C.

Signed..... *Supercargo.*

Approved..... *Master.*

11—6773

SECOND, THIRD AND FOURTH PAGES OF SUPERCARGOES' REPORT

charged into lighters, on rafts or scales. When the cargo is delivered from dock after the vessel sails, the agent is expected to forward the receipt, and over, short and damaged report on completion of delivery of cargo to the supercargo.

In case a vessel encounters heavy weather during the voyage, the master should order a survey by a competent surveyor of deckload, if any, and hatches, before either are disturbed. If damage is found, subsequent surveys are made during the voyage. The supercargo is expected to note a protest immediately, and extend the protest, as soon as amount of loss or damage is determined. This should be done in any case before the termination of the voyage. If there is dispatch or demurrage involved in the charter or freighting agreement, the supercargo is to have a statement of such dispatch or demurrage signed by the agent or consignee as the case may be, and to advise the owners or charterer of the details.

Prior to loading the cargo, the supercargo is to go through the holds with the chief officer and see that they are clean and in every way fit to receive the cargo. If they are not it is the duty of the first officer to see that they are immediately put in proper shape. On completion of discharge at each port, a thorough search of holds should be made by the supercargo in conjunction with the chief officer to see that the cargo for that port has been discharged and that the cargo remaining in the vessel is stowed in such a manner that it will not shift enroute. The supercargo is warned that care should be taken to see that the holds, especially between and shelter decks, are properly dunnaged for the carriage of dry and perishable cargo.

Instructions are given the supercargo to keep a log and to enter therein a list of the people he meets, such as agents, port authorities, shippers, consignees, etc., also suggestions that would better the government's interests and the working of the vessel. He is to keep a list of vessels that are in the same port at the same time, giving their flag, type and deadweight, class of cargo being handled, data as to dispatch and turnout of cargo. He is also asked to obtain as much information as possible on the ports of call, port regulations, rates of pilotage, etc. Finally the supercargo is expected in conjunction with the chief officer to make up a stowage plan as cargo is being loaded, giving details of class of cargo, tonnage, location in the ship, etc.

Digitized by Google

H. Penton, Lake Manager, Quits

Great Lakes District Head Leaves Position Held During the War — Made Splendid Record — Capt. R. W. England Promoted

HENRY PENTON, district manager, Great Lakes district of the Emergency Fleet corporation, resigned his position Nov. 30. Mr. Penton is the only district executive to hold office continuously from the creation of the district in August, 1917. The first requisitioned vessel was delivered from Mr. Penton's district, also the initial vessel to be built under direct contract with the corporation. According to a recent announcement of the Emergency Fleet corporation, Great Lakes builders have already delivered one-fourth of the total number of merchant vessels contemplated by the corporation for the entire United States.

Mr. Penton is a naval architect of recognized standing who for many years was a member of the firm of Babcock & Penton, Cleveland He also is an experienced shipyard executive having served in various Great Lakes yards in this capacity. For these reasons he had qualifications which quickly brought him rank as one of the most efficient district managers appointed. He knows ships from keelson to truck and was a typical example of what nowadays is becoming rare—the right man in the right place.

He worked incessantly to build up the production of the Great Lakes district and his efforts were rewarded with gratifying success. Throughout the country, he made the Great Lakes district recognized as being in the front rank. The cry was for ships and he furnished them. He ignored useless complications so prevalent in government affairs and often went ahead on his own responsibility—and he got results. Shipping board executives and shipyard managers recognized in him an executive of rare talents.

In his announcement to the district staff, Mr. Penton said:

"Without your assistance and cooperation, the enviable record and unique standing of this district would have been utterly impossible.

"The older members of this force have taken part in a performance which stands without a parallel in history. At this date this district has completed and sent to sea, in about 27 months, 374 cargo vessels of 1,396,890 total deadweight tonnage and 30 tugs. The total length of this fleet if placed end to end would be 19.2 miles.

"An additional reason for congratulation lies in the fact that while unfortunately a number of these vessels fell victims to the war and a few became losses because of collision and other disaster, there has not been a single instance reported, so far as I have knowledge, of a serious breakdown at sea nor of a loss due to imperfect construction or equipment. This ought to be a course of profound gratification to you all, as much so as it is to me, and every member of this staff has a right to feel that he shares in the credit for

HENRY PENTON

a most striking record. In the days to come it will be sufficient for you to point to your share in this as your part in the war.

"I do not think it is too much to say that without the assistance of the Great Lakes district and the revelation of its resources, the outcome of the war might have been different.

"There remain still to be delivered from the district 54 cargo ships and 18 tugs all of which will be ready by the opening of navigation in 1920. The builders of the Great Lakes showed the stuff they are made of by expanding their capacity to meet the national need even during the stress of war times, almost without government assistance. Out of over $225,000,000 advanced by the Emergency Fleet Coporation for shipyard construction and expansion less than $2,250,000 came to the Great Lakes. They demonstrated beyond a doubt that but for canal limitations between the lakes and seaboard the shipping center of the United States would be on the Great Lakes. The lake yards outpointed the rest of the country at every stage; speed of construction, riveting output, tonnage per man, number of ships per berth, cost of supervision and other details. One yard, with only three berths delivered 14 completed 4200-ton ships in the past eleven months and others were not far behind."

Mr. Penton is succeeded by Capt. R. W. England, who formerly was assistant district manager for the Great Lakes district. Captain England is a master mariner who has been connected with Great Lakes trade for many years. Before becoming associated with the Fleet corporation, he sailed vessels for the Becker fleet. His long association with Great Lakes conditions, made him a valuable assistant to Mr. Penton during the days when the need of ships was imperative. His knowledge of Great Lakes yards and conditions is an invaluable asset in carrying on the work in that district.

Capt. England is succeeded by F. B. Worden who has been with the Great Lakes district since its inception. The members of the staff who worked with Mr. Penton presented him with a chair, footstool, reading lamp and smoking set.

Operating Costs

A study of operating costs under the American flag shows that wages are approximately 22.5 per cent of the total, if the coaling, stevedoring and agency expenses are not taken into account. This is an estimate figured by one rather prosperous new steamship company.

The operating expenses of a fleet of seven ships for a period of approximately one year represented a total of $810,585.54, exclusive of coaling, stevedoring and agency costs. These latter were charged up to the cost of handling cargo and not with the expenses of running the ships. In this total operating cost insurance was slightly more than 40 per cent, or actually $337,496. The outlay for wages was in round figures $182,000; repairs and renewals, $137,000; provisions, $73,000; deck supplies, $27,000; engine room supplies, $27,000; for supplying crews, $3000 and miscellaneous $16,000.

Digitized by Google

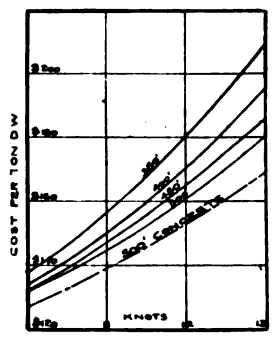


FIG. 1

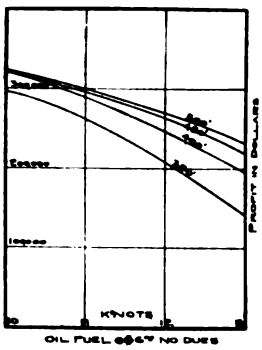


FIG. 2

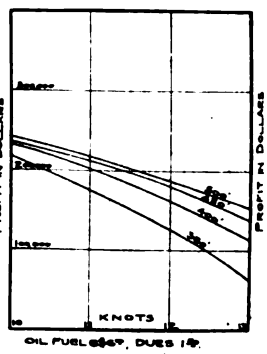


FIG. 3

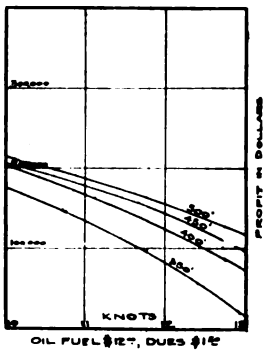


FIG. 4

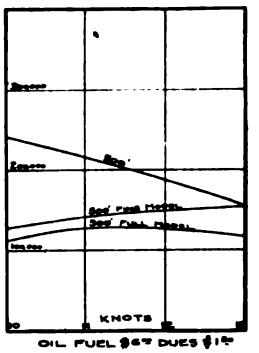


FIG. 5

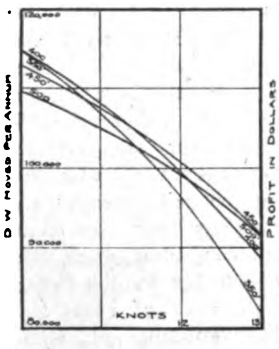


FIG. 6

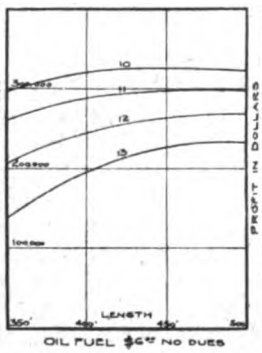


FIG. 7

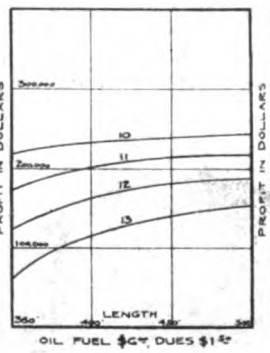


FIG. 8

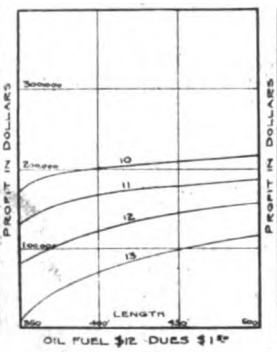


FIG. 9

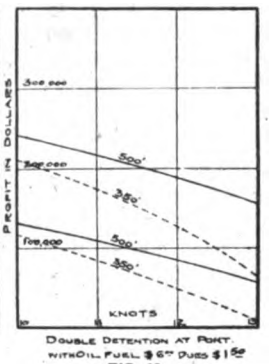


FIG. 10

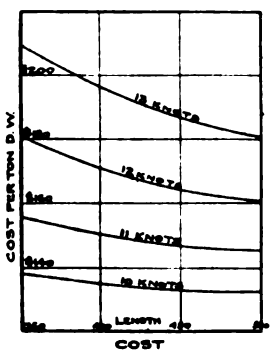


FIG. 11

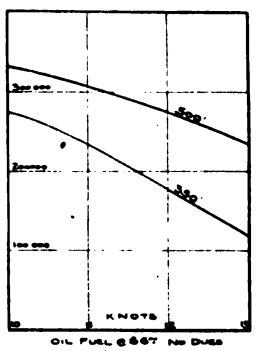


FIG. 12

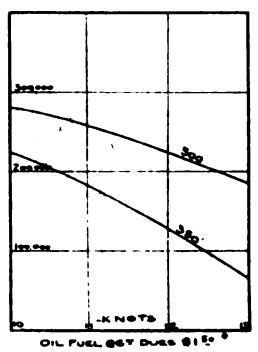


FIG. 13

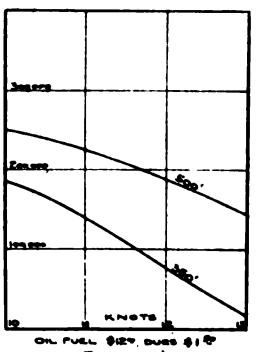


FIG. 14

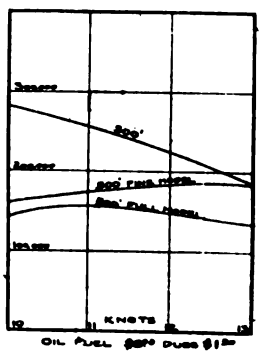


FIG. 15

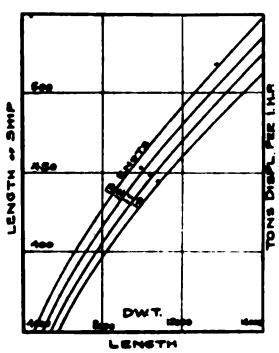


FIG. 16

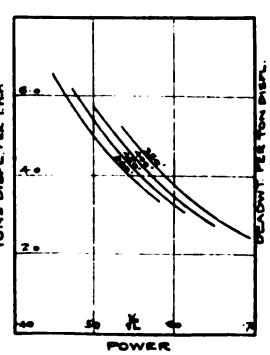


FIG. 17

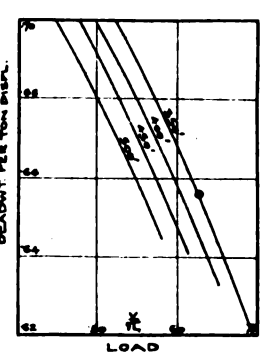


FIG. 18

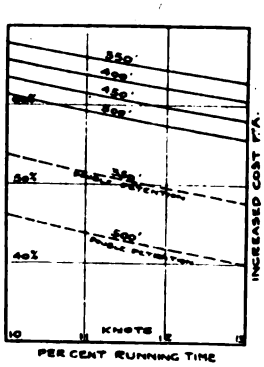


FIG. 19

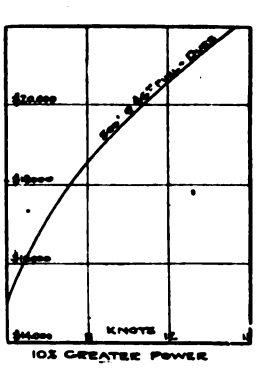


FIG. 20

FIGS. 1 TO 20—CURVES SHOWING THE IMPORTANCE OF THE VARIOUS FACTORS ENTERING INTO SHIP OPERATION COSTS

Digitized by Google

Designing Economical Freighters

Data Obtained on Ship Operating Costs, Compiled From Vessels of Varying Capacities—Importance of Proper Size and Speed

BY ALFRED J. C. ROBERTSON

CIRCUMSTANCES of the late war and the necessity of largely rebuilding the shipping trade of the world have called the attention of naval architects to the need of a careful mathematical and scientific analysis of the operation costs of ships, and, as a result, several investigators have recently given us the benefit of valuable data on the subject.

In the opinion of the writer, greater progress could probably be made if naval architects were able to place before ship operators the actual operating costs under certain assumed conditions and with various combinations of size, speed and form of ship. Figures have been compiled by the United States shipping board covering the operation of certain ships over various routes. These figures, however, were for vessels varying in their general characteristics, and it appears to the writer that any true comparison can only be made if the variation in the characteristics of the vessels is directly limited to that feature which it is desired to investigate.

The method adopted has been to take vessels of four different sizes, of standard proportions, and to work out on the same basis the first cost and the cost of operation for each vessel at each of four different speeds. In addition, the writer has investigated particular features in the cost of operation for one or more sizes of ship. The scope of this series of calculations for an assumed length of route of 3500 nautical miles between fueling ports is shown, each size of ship being investigated for 10, 11, 12 and 13 knots sea speed, using oil as fuel, except as noted:

(*A*) Block coefficient chosen for each specific speed.

1—With minimum port detention; length of ship 350, 400, 450 and 500 feet.

2—Minimum port detention, coal burning; length of ship 500 feet.

3—Minimum port detention, concrete ship; length of ship 500 feet.

4—Double port detention; length of ship 350 feet and 500 feet.

5—Minimum port detention, with 10 per cent increased resistance, 500-foot ship.

(*B*) Fixed block coefficient for all speeds.

6—Minimum port detention; fine model 500-foot ship.

7—Minimum port detention; full model 500-foot ship.

Each of these ships was investigated for fuel rates of $6 and $12 with tonnage dues, and with a fuel rate of $6 figures were also calculated without tonnage dues. In addition to the above calculations, another series was made with a steaming distance of 7000 nautical miles between ports, but as the character of the results was the same throughout, the investigation for this length of run was not made so complete. Such figures as the author thinks would be of interest for the 3500 nautical mile haul are given herewith in Fig. 21.

In order to extend these calculations, a considerable number of assumptions had to be made, as follows:

(*a*) *Proportions*—The length of the vessel was taken as the water-line length, which would also be the length between perpendiculars for twin-screw vessels. The length between perpendiculars for single-crew vessels would be somewhat greater than the figures given. The breadth molded was taken as equal to 0.10 of the length on water line, plus 14 feet, this proportion giving ample beam for stability even with a considerable amount of superstructure. The load draft in each case was chosen to give a breadth upon draft ratio of 2.25, which is approximately the best ratio for economical propulsion.

(*b*) *Speed and Power*—The speed in each case is such as could be maintained in any ordinary weather at sea. The power was arrived at in each case from tank test data, a propulsive coefficient of 52 per cent being assumed and a margin of power allowed to maintain the required speed at sea. A discount of 20 per cent from the figures given for indicated horsepower should be made to arrive at the horsepower on a smooth-water trial trip fully loaded.

(*c*) *Weight of Ship*—The weight of the steel hull has been found to vary slightly with the block coefficient, and this variation has been allowed for. The weight of outfit corresponds to a first class specification and has been taken as identical for each length of vessel irrespective of speed. The engine-room weights are taken as varying directly with the horsepower, taking four horsepower to each ton of engine-room machinery. The total deadweight was assumed to be the difference between displacement and the sum of steel hull, outfit, and engine-room weights.

(*d*) *Costs of Ships*—The cost of the steel hull was assumed to vary directly with the weight of steel used, and the cost of outfit was taken as constant for each size of ship. The cost of propelling machinery is based directly upon the horsepower developed. The basis of these costs was so chosen that the 400-foot ship, at 11 knots speed, would show a cost of approximately $150 per deadweight ton.

(*e*) *Weight of Fuel and Stores*—The fuel oil consumed was figured at one pound per indicated horsepower per hour, plus a fixed amount for each size of vessel in port. The port fuel consumption allowed for minimum detention was taken as 20 tons for the 350-foot ship, 30 tons for the 400-foot ship, 40 tons for the 450-foot ship and 50 tons for the 500-foot ship. A figure was taken for fresh water, make-up feed, and consumable stores equal to one-half the weight of the fuel oil required per voyage.

In fixing a fuel rate per ton of oil fuel it is intended that this figure should cover also the cost of lubricating oil, fresh water and similar charges based on the horsepower of the engine. For this reason $6 and $12 as fuel rates would represent a cost somewhat lower than this for the oil alone.

(*f*) *Port Detention*—The time in port is of great importance in the estimated cost of operation of a ship. This is a variable figure, and calculations are given showing the effect with minimum detention and with a detention equal to twice the minimum. I have taken a figure for the minimum length of time in which a vessel should be detained in port as depending on the quantity of cargo which must pass through every square foot of hatch. This quantity, of course, with similarly designed ships depends directly upon the depth of the ship, and I have therefore allowed one day in port for every 5 feet in depth of ship, as a minimum port detention figure. In addition to the above port detention, 30 days per

Presented at the twenty-seventh general meeting of the Society of Naval Architects and Marine Engineers held in New York, Nov. 13 and 14.

Digitized by Google

annum have been allowed for overhaul.

(g) Operating Expenses—The cost of crew is estimated from the United States shipping board's rate current at the beginning of 1919 and includes an allowance of $300 per annum per man for sustenance. In addition, a management allowance has been made of $500 per month. The cost of manning, however, must be considered as only approximate, as the exact number of crew would depend to a certain extent on design of ship and route.

Depreciation, insurance and upkeep have been figured at 13 per cent per annum on the first cost of the vessel. Tonnage dues have been assumed at $1.50 per net ton register, and the assumption has been made, for the sake of comparison, that the net tonnage in each ship would be equal to one-third of the load displacement in tons.

After figuring out the cost of the ship, its deadweight carrying capacity in tons of 2240 pounds, and cost of operation per annum, these figures have been reduced in each case to the basis of $1,000,000 investment and in order to make the figures more easily grasped I have assumed a gross freight rate of $6 per deadweight ton for the 3500 nautical mile run. From this rate, however, I have deducted $1 per ton for handling and 15 cents per ton brokerage, showing a net revenue of $4.85 per deadweight ton on this run. For the 7000-mile run I have assumed the freight rate of $10 with a deduction of $1 per ton for handling and 25 cents per ton for brokerage, giving a net rate of $8.75.

The profits in operation calculated on the above assumptions have in each case been figured upon the assumption that the ships are operated on each leg of their route with a full cargo. This assumption is only a hypothetical one. The freight rate should therefore be so adjusted that it shall bear the proportion to the asumed rate that a full cargo does to the average percentage of cargo carried per trip. For example, if the ship operated with an 80 per cent load in one direction and a 20 per cent load on the return voyage, 100 per cent load is divided between the two voyages, so that only 50 per cent freight movement is achieved and the freight rate would therefore be doubled to realize the profits shown on the table, Fig. 21.

The results of the calculations are shown in a series of diagrams on Figs. 1 to 20 and may be readily summarized as follows:

(a) The Cost Per Deadweight Ton—Fig. 1 shows this to be extremely sensitive to speed, increasing rapidly in all sizes of ship with increase of speed. Fig. 11 shows that the cost is only slightly sensitive to increase in size showing tendency to fall with increase up to about 450 feet at 10 knots and a larger size for faster vessels.

(b) Deadweight Moved Per Million Dollar Investment Per Annum—Fig. 6 shows clearly that for large freight movement slow speed is essential. At 10 knots a 350-foot ship will move more cargo than any large vessel. At 11 knots the 400-foot ship is the best; at 12 knots the 450-foot ship is better, and at 13 knots the 500-foot ship will move as much as any smaller size.

(c) Profits Earned Per Million Dollar Investment—Figs. 2, 3 and 4 show the profits earned for a 3500-knot run as plotted upon speed of ship, and Figs. 12, 13 and 14 are corresponding diagrams for the 7000-knot run. Figs. 5, 6 and 7 show results for the 3500-knot run plotted on the size of ship.

All these diagrams show clearly that the slow-speed ship is the money-earning ship, and there is a steady decline as the speed increases; the 350-foot ship earning twice as much at 10 knots as at 13 knots.

It will be noted from Figs. 7, 8 and 9 that at a speed of 10 knots, a ship 400 feet long gives practically the best earning proposition that can be designed, and that for 11 knots a length of 450 feet is probably the maximum economical length. These figures, of course, assume the ship to have a capacity cargo, and even a small reduction in this cargo would tell heavily against the larger ships.

These curves completely justify the building of tramp ships between 350

			350-FOOT SHIPS, MINIMUM PORT DETENTION				350-FOOT SHIPS, DOUBLE PORT DETENTION				400-FOOT SHIPS, MINIMUM PORT DETENT.				450-FOOT SHIPS, MINIMUM DETENTION			
1	COLUMN No.		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
2	LENGTH ON WATERLINE	FEET	350'-0"	350'-0"	350'-0"	350'-0"	350'-0"	350'-0"	350'-0"	350'-0"	400'-0"	400'-0"	400'-0"	400'-0"	450'-0"	450'-0"	450'-0"	450'-0"
3	BREADTH	"	45'-0"	45'-0"	45'-0"	45'-0"	45'-0"	45'-0"	45'-0"	45'-0"	54'-0"	54'-0"	54'-0"	54'-0"	59'-0"	59'-0"	59'-0"	59'-0"
4	LOAD DRAFT	"	21'-3½	21'-3½	21'-3½	21'-3½	21'-3½	21'-3½	21'-3½	21'-3½	24'-0"	24'-0"	24'-0"	24'-0"	26'-2½	26'-2½	26'-2½	26'-2½
5																		
6	SPEED ON SERVICE	KNOTS	10.0	11.0	12.0	13.0	10.0	11.0	12.0	13.0	10.0	11.0	12.0	13.0	10.0	11.0	12.0	13.0
7	SPEED-LENGTH RATIO	$\frac{V}{\sqrt{L}}$	.530	.587	.641	.695	.535	.587	.641	.695	.50	.55	.60	.65	.471	.518	.565	.613
8	BLOCK COEFFICIENT	C_B	.768	.740	.712	.685	.768	.740	.712	.685	.783	.762	.734	.711	.809	.782	.755	.731
9	LOAD DISPLACEMENT	TONS	8,196	7,897	7,599	7,363	8,196	7,897	7,599	7,363	11,686	11,286	10,872	10,531	16,090	15,553	15,016	14,593
10	INDICATED HORSE POWER	I.H.P.	1,866	1,970	2,470	3,028	1,866	1,970	2,470	3,028	2,021	2,818	3,121	3,862	2,600	3,200	3,877	4,749
11	RATIO, TONS DISPL. PER I.H.P.	TONS	5.234	4.008	3.076	2.428	5.234	4.008	3.076	2.428	5.782	4.467	3.483	2.727	6.188	4.860	3.873	3.061
12																		
13	WEIGHT OF HULL AND OUTFIT	TONS	2,108	2,081	2,055	2,034	2,108	2,081	2,055	2,034	3015	2,970	2941	2905	4,166	4,119	4,069	4,026
14	WEIGHT OF PROPELLING M&Y	"	392	492	618	757	392	492	618	757	605	629	780	968	680	800	969	1,187
15	TOTAL DEADWEIGHT	"	5,696	5,324	4,524	4,562	5,696	5,324	4,524	4,562	8,166	7,679	7151	6,658	11,274	10,634	9,978	9,326
16	RATIO, DEADWEIGHT TO DISPL.	"	.695	.675	.596	.620	.695	.675	.596	.620	.699	.680	.658	.632	.701	.684	.664	.641
17																		
18	COST OF HULL AND OUTFIT	$	580,780	574,000	567,260	562,280	580,780	574,000	567,260	562,280	833,780	824,800	814,280	807,280	1,188,280	1,149,800	1,151,000	1,120,280
19	" " PROPELLING MACHINERY	"	203,880	284,100	321,100	393,640	203,880	284,100	321,100	393,640	262,750	326,960	408,780	502,040	336,000	414,000	504,010	617,370
20	" " SHIP	"	784,330	830,100	888,600	955,920	784,330	830,100	888,600	955,920	1,096,480	1,151,430	1,220,980	1,309,320	1,493,280	1,563,800	1,655,000	1,737,650
21	" " PER TON DEADWT	"	137.70	155.91	196.40	209.62	137.70	155.91	196.40	209.62	134.27	149.92	170.70	196.71	132.48	146.99	165.86	186.38
22																		
23	FUEL CONSUMED PER VOYAGE	TONS	265	300	342	384	265	320	362	404	346	387	436	494	446	494	545	611
24	STORES AND FRESH WATER	"	132	150	171	192	132	160	181	202	173	193	218	247	223	247	272	305
25	CARGO DEADWEIGHT	"	5299	4874	4413	3966	5266	4844	4385	3966	7447	7099	6497	5915	10,605	9633	9,161	8,410
26																		
27	TIME ON VOYAGE	DAYS	14.65	15.26	15.18	11.88	14.85	15.26	15.18	11.88	14.58	15.24	15.18	11.82	14.58	15.24	15.18	11.82
28	" IN PORT	"	5.18	5.18	5.18	5.18	10.30	10.30	10.30	10.30	5.80	5.80	5.80	5.80	6.50	6.50	6.50	6.50
29	" PER ANNUAL OVERHAUL	"	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
30																		
31	NUMBER OF TRIPS PER YEAR		18.97	18.80	18.96	20.46	13.46	14.22	14.98	15.67	16.44	17.58	18.66	19.68	16.89	16.95	17.96	18.90
32	TIME ON VOYAGE PER YEAR	DAYS	247.4	241.3	280.2	229.6	196.4	188.5	181.3	174.6	289.7	233.1	226.7	220.8	231.7	224.6	218.2	212.1
33	TIME IN PORT PER YEAR	"	117.6	123.7	129.8	135.4	168.6	176.5	183.7	190.4	126.3	151.9	138.3	144.2	135.3	140.2	146.8	152.3
34	PERCENTAGE TIME UNDER WAY	%	67.8	66.1	64.4	62.5	53.8	51.6	49.7	47.8	65.7	63.9	62.1	60.8	65.5	61.6	59.8	58.1
35																		
36	COST OF MANNING AND MARINE P.A.	$	72,918	72,918	72,918	72,918	72,915	72,915	72,915	72,915	81,300	81,300	81,300	81,300	98,490	98,490	98,490	98,490
37	DEPRECIATION, INSURANCE, UPKEEP, P.A.	"	101,943	107,513	113,518	124,266	101,943	107,513	113,518	124,266	142,542	149,686	158,727	170,210	194,122	202,735	212,550	226,891
38	FUEL OIL @ $6.00 A TON PER ANNUM	"	28,980	32,760	39,727	47,141	23,017	27,302	32,406	37,742	34,130	40,872	48,815	58,332	42,322	50,241	58,725	69,290
39	DUES @ $1.50 PER NETT TON, P.A.	"	69,645	71,884	73,849	75,211	55,159	56,185	56,681	57,235	96,049	99,264	101,436	103,615	127,635	131,803	135,844	137,364
40																		
41	ANNUAL COST OF OPERATION: FUEL @ $6.00 NO DUES	$	201,866	215,588	228,160	244,321	197,895	208,130	220,639	234,922	257,972	271,810	288,842	309,842	335,134	351,466	369,765	393,671
42	" " " WITH DUES	"	271,409	288,442	301,765	319,333	265,054	284,285	277,320	292,158	354,031	371,014	390,276	413,457	462,949	483,269	504,613	53,055
43	" " @ $12.00	"	298,387	316,222	341,436	366,674	276,071	291,587	309,926	329,900	388,181	411,836	439,093	471,789	503,491	533,810	563,342	600,345
44																		
45	CARGO MOVED P.A. PER $1,000,000	TONS	114,650	106,863	96,144	81,553	90,422	82,980	73,892	64,437	114,685	108,365	99,344	88,907	112,835	107,828	100,742	91,478
46																		
47	COST OF OPERATION ($6 FUEL, NO DUES	$	257,374	257,304	256,703	255,596	282,311	280,729	278,525	275,763	235,273	236,069	236,865	236,645	274,433	275,371	276,158	276,887
48	PER ANNUM PER MILLION $6 " WITH	"	340,033	343,844	339,833	334,778	322,657	318,577	312,311	306,640	328,879	322,215	319,643	315,782	310,041	309,887	308,432	308,622
49	DOLLARS INVESTMENT ($12 " "	"	380,440	383,325	384,740	383,394	391,985	381,267	348,780	345,123	384,006	387,667	389,623	390,334	338,817	342,103	344,581	345,498
50																		
51	PROFIT PA PER $1,000,000 INVESTMENT $6.00 FUEL, NO DUES	$	298,678	260,981	209,845	159,936	186,296	181,724	108,396	68,786	320,844	289,608	245,253	194,554	327,817	296,125	262,441	217,087
52	" " $6.00 WITH	"	210,015	174,421	126,776	81,254	116,910	84,976	44,610	8,875	253,198	203,452	142,175	115,417	257,209	211,609	179,967	138,032
53	TON, LOSS OR PROFIT WITH $12.00	"	175,610	134,956	82,068	11,938	86,564	61,186	8,141	Loss 32,604	202,071	168,000	122,195	70,866	206,733	175,393	144,048	98,186
54																		
55																		

FIG. 21—OPERATING COSTS OF 350, 400, 450 AND 500-FOOT SHIPS WITH MINIMUMS AND

Digitized by Google

feet and 400 feet in length, with a sea speed of 10 knots.

(*d*) *Form of Ship*—To compare the effect of a single design run at various speeds, with designs worked up for the individual speeds, calculations were made which are plotted on Fig. 5. The figures for these calculations are shown in columns 32 to 39, Fig. 21.

They show that a vessel designed for a speed of 13 knots, and powered for that speed, will earn more for her owner running up to full speed than at a lower running rate. On the other hand, a vessel designed for 10 knots, with power good for a speed of 13 size and fullness, a slight change in the curve of areas of afterbody made 6½ per cent difference in resistance without change of displacement. The cost to the shipowner of this extra 10 per cent is one of the astonishing features of the figures compiled.

At 10 knots the extra horsepower for the 500-foot ship is 325. This gives an actual loss in earning capacity of $16,636 per annum, which, at 5 per cent compound interest, represents in 25 years 79 per cent of the cost of the ship, or, in this particular case, $1,610,250. At 13 knots the cost is even greater; the 583 additional horse-

the superior earning capacity of this type of ship.

(*g*) *Application to Design*—Figs. 16, 17 and 18 give, respectively, size of ship, power of ship, and capacity of ship for the various speeds and sizes dealt with in this paper. These three diagrams should be of some use for preliminary design work to rapidly approximating the dimensions of a new ship.

(*h*) *Fuel*—Figures compiled for the 500-foot ship indicate that for the same profits the cost of coal fuel could only be 53 per cent of the cost of oil fuel.

(*i*) *Concrete Ships*—The 500-foot ship was calculated also as a concrete ship,

500-FOOT SHIPS, MINIMUM DETENTION				500-FOOT SHIPS, DOUBLE DETENTION				500-FOOT SHIPS, 10% GREATER POWER				500-FOOT SHIP, BLOCK COEFF. .780				500-FOOT SHIP, BLOCK COEFF. .828			
20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39
500'-0"	500'-0"	500'-0"	500'-0"	500'-0"	500'-0"	500'-0"	500'-0"	500'-0"	500'-0"	500'-0"	500'-0"	500'-0"	500'-0"	500'-0"	500'-0"	500'-0"	500'-0"	500'-0"	500'-0"
64'-0"	64'-0"	64'-0"	64'-0"	64'-0"	64'-0"	64'-0"	64'-0"	64'-0"	64'-0"	64'-0"	64'-0"	64'-0"	64'-0"	64'-0"	64'-0"	64'-0"	64'-0"	64'-0"	64'-0"
28'-8½	28'-8½	28'-8½	28'-8½	28'-8½	28'-8½	28'-8½	28'-8½	28'-8½	28'-8½	28'-8½	28'-8½	28'-5½	28'-5½	28'-5½	28'-5½	28'-5½	28'-5½	28'-5½	28'-5½
10.0	11.0	12.9	13.0	10.0	11.0	12.0	13.0	10.0	11.0	12.0	13.0	10.0	11.0	12.0	13.0	10.0	11.0	12.0	13.0
.447	.491	.536	.581	.447	.491	.536	.581	.447	.491	.536	.581	.447	.491	.536	.581	.447	.491	.536	.581
.825	.80	.775	.760	.825	.80	.775	.750	.825	.80	.775	.750	.760	.780	.780	.760	.825	.825	.828	.825
21,452	20,802	20,152	19,500	21,452	20,802	20,152	19,500	21,452	20,802	20,152	19,500	19,500	19,500	19,500	19,500	21,452	21,452	21,452	21,452
3,254	3,994	4,825	5,826	3,254	3,994	4,825	5,826	3,879	4,595	5,508	6,411	2,682	3,460	4,519	5,826	3,254	4,032	5,956	8,216
6,592	5,208	4,176	3,346	6,592	5,208	4,176	3,346	5,988	4,736	5,797	5,041	7,552	5,636	4,516	3,346	6,592	5,320	5,614	2,611
5,826	5,268	4,608	3,448	5,826	5,268	5,606	3,448	5,826	5,268	5,606	3,448	5,448	5,448	5,448	3,448	5,826	5,826	5,826	5,826
814	998	1,206	1,487	814	998	1,206	1,487	998	1,098	1,327	1,608	1,487	1,487	1,487	1,487	2,084	2,054	2,054	2,054
18,012	14,236	13,440	12,595	18,012	14,236	13,440	12,595	14,931	14,136	13,319	12,449	12,595	12,595	12,595	12,595	13,772	13,772	13,772	13,772
700	684	666	646	700	684	666	646					646	646	646	646	642	642	642	642
1,882,780	1,548,280	1,232,780	1,819,280	1,562,780	1,548,280	1,532,780	1,518,280	1,562,780	1,548,280	1,532,780	1,518,280	1,518,280	1,518,280	1,518,280	1,518,280	1,862,780	1,862,780	1,862,780	1,862,780
423,020	818,220	627,260	787,640	423,020	818,220	627,260	787,640	465,325	871,142	665,975	833,404	757,640	787,640	787,640	787,640	1,067,350	1,067,350	1,067,350	1,067,350
1,986,770	2,067,470	2,176,880	2,607,470	1,986,770	2,067,470	2,160,000	2,276,880	2,028,079	2,119,552	2,222,775	2,351,654	2,275,890	2,275,890	2,275,890	2,275,890	2,630,700	2,630,700	2,630,700	2,630,700
132.57	148.53	160.72	180.47	132.57	148.53	160.71	180.47	138.46	149.57	166.46	180.42	180.47	180.47	180.47	180.47	191.48	191.49	191.45	191.44
588	670	678	761	588	670	728	801	614	682	746	826	454	543	640	751	589	623	824	1038
278	310	339	376	291	335	364	400	307	341	373	413	227	271	320	375	279	312	412	519
14.175	13.308	12.428	11.469	14.138	13.231	12.348	11.394	14.010	13.113	12.200	11.210	11.914	11.781	11.635	11.469	12.334	12.857	12.336	12.218
14.68	13.26	12.15	11.22	14.58	13.26	12.15	11.22	14.58	13.26	12.15	11.22	14.58	13.26	12.15	11.22	14.58	13.26	12.15	11.22
7.25	7.25	7.25	7.25	14.50	7.25	7.25	14.50	7.25	7.25	7.25	7.25	7.25	7.25	7.25	7.25	7.25	7.25	7.25	7.25
30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
13.34	16.33	17.26	18.14	11.52	12.07	12.87	13.02	15.34	16.33	17.26	18.14	18.34	16.33	17.26	18.14	15.34	16.33	17.26	18.14
223.7	216.5	209.7	203.5	168.0	160.0	152.7	146.2	223.7	216.6	209.7	203.5	223.7	216.5	209.7	203.5	223.7	216.5	209.7	203.6
141.3	148.5	156.3	161.5	197.0	206.0	212.3	218.8	141.3	148.5	155.3	161.5	141.3	148.5	156.3	161.5	141.3	148.5	156.3	161.5
61.3	59.3	57.5	55.7	46.0	43.8	41.8	40.0	61.3	59.3	57.5	55.7	61.3	59.3	57.5	55.7	61.8	59.3	57.5	55.7
106.176	106.176	106.176	106.176	106.176	106.176	106.176	106.176	106.176	106.176	106.176	106.176	106.176	106.176	106.176	106.176	106.176	106.176	106.176	106.176
268.150	268.771	269.660	296.068	268.180	268.771	280.800	293.845	263.649	275.521	286.954	308.718	296.845	296.845	296.845	296.068	341.991	341.991	341.991	341.991
51.388	60.750	70.214	81.739	40.297	46.821	54.306	62.874	53.712	66.822	77.256	89.915	41.786	53.203	66.276	81.739	51.450	61.041	85.383	112.576
156.386	149.846	173.912	176.865	123.543	125.340	126.656	126.945	156.388	149.846	173.912	176.865	149.645	159.217	168.786	176.845	194.662	173.172	185.148	194.586
418.684	455.887	467.190	483.780	404.623	423.448	441.882	464.615	423.537	448.819	472.345	501.804	443.827	455.244	466.313	483.780	413.617	509.208	533.600	561.143
272.049	608.845	631.102	660.645	628.186	549.008	568.537	591.860	679.923	618.367	646.277	678.689	593.592	614.481	636.604	660.645	664.169	684.360	718.648	736.731
623.427	664.286	701.346	742.364	560.483	597.829	623.449	654.134	633.634	665.189	723.812	768.682	655.178	667.644	703.882	742.364	718.619	745.221	803.981	840.707
103.801	108.089	89.360	91.414	82.018	72.243	71.858	69.183	108.063	101.036	96.736	86.471	80.303	84.531	88.236	91.414	75.420	79.685	88.248	86.228
208.331	210.739	211.882	212.548	203.761	204.824	204.578	204.148	208.857	211.626	212.516	213.383	198.015	200.080	203.778	212.548	189.918	193.564	202.798	213.306
288.084	291.891	292.174	290.280	266.785	265.546	263.211	258.525	288.947	291.766	290.739	288.892	260.750	269.988	279.717	290.280	287.449	266.181	279.177	287.274
819.947	822.278	824.688	829.184	286.278	289.018	288.631	287.413	312.431	323.295	328.407	326.876	279.091	293.366	308.839	328.196	278.086	289.368	305.615	334.219
321.749	298.884	289.798	280.790	194.018	169.864	143.936	111.884	308.148	278.398	246.984	208.901	194.467	209.946	222.179	230.789	178.809	193.988	196.105	195.200
248.996	218.834	189.279	163.678	131.802	109.982	86.800	56.218	228.003	198.263	168.711	130.792	128.740	139.287	148.237	153.078	113.518	124.521	125.725	121.232
317.153	187.460	164.772	117.162	111.509	86.618	59.880	29.718	201.819	166.736	133.963	92.448	110.379	116.610	119.115	117.162	93.761	103.117	93.268	76.287

AJCR

DOUBLE PORT DETENTION—FULL DATA IS TABULATED IN THE COLUMN AT THE LEFT

knots, shows a falling off in earning at speeds over about 11 knots. This diagram clearly shows the advantage of having a ship carefully designed to work under specific conditions.

(*e*) *Value of Model Experiments*—Fig. 20 shows the actual loss in profit for the 500-foot ship where the power to drive it is 10 per cent above the minimum. This 10 per cent seems large, but it is a modest estimate of the increase of power necessary in a model designed without the use of experimental data. Even careful students of ship resistance might produce a ship design of this kind. During 1919, for example, we were able to lower the resistance of a 400-foot ship at 10 knots by 8 per cent through increasing the displacement by 1½ per cent. In another case, with two ships of identical power costing the ship operator a loss in profit of $24,789 per annum, equal to $2,782,230 for the 500-foot 13-knot ship in a life of 25 years.

(*f*) *Detention in Port*—Fig. 10 shows for the 500-foot and 350-foot ships the difference in realized profits if these ships are detained twice as long in port as the ship with which they are compared. Every shipowner is aware that the earning capacity of the ship is measured by its time at sea, but these figures will help to emphasize the necessity for greater care being given to the improvement of methods of loading and unloading ships.

In Fig. 19 the time at sea is expressed as a percentage of the year, and it is shown that the slow-speed ship can remain at sea for a higher percentage of its life, and to this largely is accountable and the assumption was made, for the sake of comparison, that depreciation, insurance and upkeep would be at the same rate per annum as the steel ship, namely, 13 per cent. On this basis, in order that the concrete ship should show the same operating profits with the steel ship (the cost of machinery being the same), the cost of hull and outfit for the concrete ship at 10 knots should not exceed 79 per cent of the cost of the hull and outfit of the steel ship, and at 13 knots it should be limited to 70 per cent of the cost of the steel hull and outfit. The cost of a concrete ship per ton of deadweight to show equal profits with the 500-foot steel ship, is shown on Fig. 1. These figures are on the basis of $6 fuel and no dues, but they are approximately true for the other working assumptions.

Digitized by Google

Problems of the Vessel Operator

Plans New Building—Seattle Pier Nears Completion—Insurance on Lumber Cargoes—Fog Signal System—New Shipping Firms

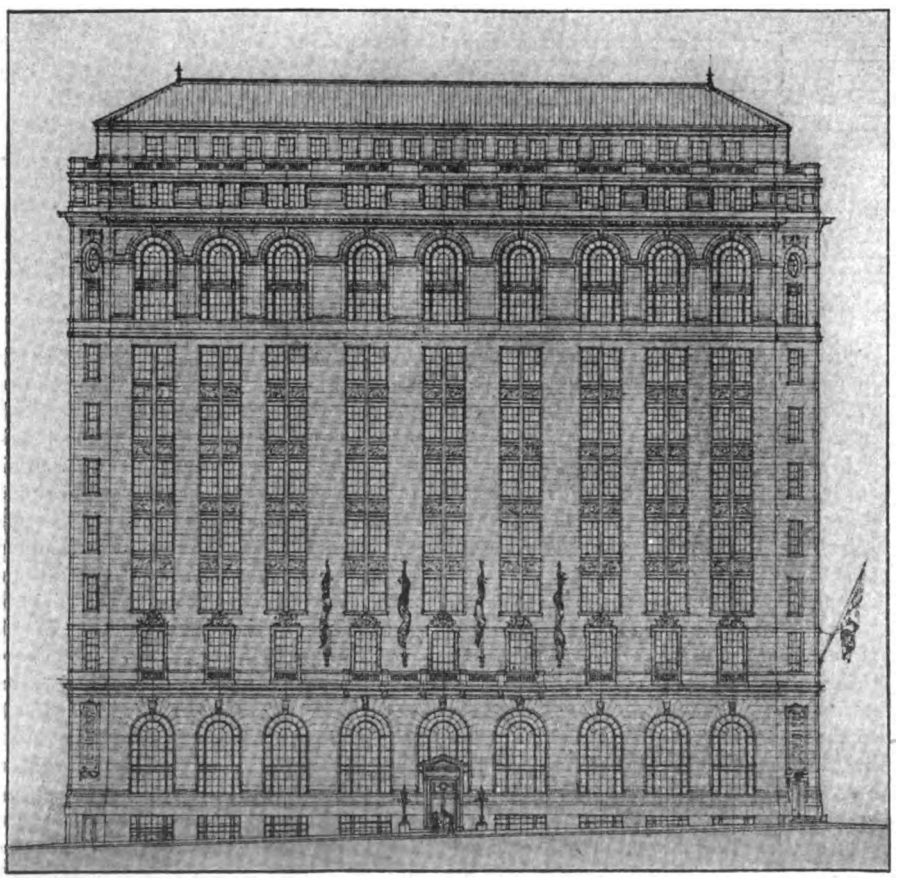
RAPID progress is being made by the International Mercantile Marine Co. in the preparation of plans for transforming the Washington building, No. 1 Broadway, New York. This building faces Battery park and Bowling green and when completed it will be known as the New Washington building. The architect in charge is Walter B. Chambers. The accompanying illustration is made from the artist's drawing of the south elevation and graphically shows how the building will appear after the remodelling is complete.

The present building is brick and brownstone and when remodelled this material will be replaced with white stone. The interior of the building will be entirely remodeled. The floor plans include a new location for the elevators and are arranged to make possible a much larger area for offices.

The remodeled building will have five entrances. Two entrances will be on Broadway, two on Greenwich street and one on Battery place. Passenger booking offices will be on the ground floor. These offices will be over 160 feet long and two stories high. The interior walls will be faced with marble. The counter space for booking passengers will be approximately 125 feet long.

The second floor will contain the company's executive offices, including private rooms and corridors for the various officials and their assistants. On this floor will also be located the board room and a space for the clerical and stenographic staffs. The Greenwich street side will be occupied by the third class ticket offices with entrances from Greenwich street and Battery place. The floors above will be arranged to accommodate the company's other departments, freight, steamship, operating, auditing, etc.

The site of the building is one of the historic landmarks of early Manhattan settlement days. It stands next to the spot where the first Dutch embattlement was located, known as Fort New Amsterdam. Prior to 1664, the first house on this location was erected by Thomas Breen. This house was purchased in 1748 by Pieter Laurenzen Cook, a Dane. In 1761 mansion on the site. This residence was long known as No. 1 Broadway. Here General Washington stopped after his victorious campaign in Boston in 1776. Later it was occupied by General Howe as his headquarters after the Continental army evacuated New York. After the Revolutionary war was over, the house was occupied by the Kennedy family until it was remodeled into a hotel. In 1882 this famous landmark was torn down to make way for the Washington building of today.



SOUTH ELEVATION OF THE INTERNATIONAL MERCANTILE MARINE CO'S NEW HEADQUARTERS

Pier Nears Completion

The new public shipping terminal now in process of construction at Smith cove, Seattle, at a cost of $2,500,000, will be ready to berth ships and handle cargo by May 1, according to George F. Nicholson, chief engineer of the Seattle port commission.

Mr. Nicholson said recently that the substructure of the terminal is 80 per cent completed, 9000 piles of a total of 12,000 have been driven, the rock rip-rap work is 60 per cent completed and the dredging will be finished in two months.

Work on the fill under the center of the pier, which will require a total of 645,000 yards of earth, is progressing rapidly and only about 6000 yards will be required to complete the fill. Mr. Nicholson said that the substructure would be completed by March 1. Bids for the first section of the transit shed were received Nov. 26.

The new terminal, which will be known as Smith cove pier B, will be 2560 feet long, 365 feet wide and will provide berthing space for 11 ocean ships at the same time, five on each side and one on the end of the pier. The transit shed will be 500 feet long and 120 feet wide, but eventually the pier will have two transit sheds 1000 feet long and 120 feet wide, according to Mr. Nicholson.

The new Seattle shipping terminal will be equipped with the latest devices for handling cargo and will have passenger accommodations, waiting rooms and landing stages. If negotiations now being conducted are successful, passenger liners of the transpacific fleet of the powerful Nippon Yusen Kaisha will use

Digitized by Google

the new pier, making it the most important terminal on the Seattle waterfront.

Lumber Cargo Insurance

On the Pacific coast, where the shipping of lumber is an important industry, it has for years been customary for the owner to pay part of the increased insurance on deckloads. Naturally, deckloads command a higher rate than underdeck cargo because of the greater risk. Trade custom provided that as a rule the operator absorb the underdeck rate on the deckload, thus reducing the cost to the shipper. However, during the war, when tonnage was so urgently in demand, not a few charters were made under which the shipper assumed the entire cost of insurance. This was done simply because the shipper had to have the space and was willing to pay the additional expense to get the ship. However, in recent months the trade has resumed the old custom and generally the owner or operator of a lumber vessel is now absorbing the extra insurance. For example, if a lumber vessel takes a rate of 2¼ per cent on under deck cargo and 8¼ per cent on deck load, the owner will pay 2¾ per cent on the deck load only, the shipper paying the balance. On lumber schooners in the lumber trade on the Pacific coast, the cargo averages about 3/5 under deck and 2/5 of the deck total.

Fog Signal System

In co-operation with the bureau of lighthouses, experiments are being carried on by the bureau of standards to establish a radio fog signaling system. Such a system, when perfected, will give to the navigator a reliable signal under any conditions of fog and make him independent of the lighthouse lamp. The principal object to be sought is the sending out of a radio signal automatically from a lighthouse and the reception of this signal upon a ship by a simple radio direction finder. If a number of important lighthouses on the Atlantic coast are equipped with this system, the safety of navigation will be greatly advanced. In connection with these experiments, radio transmitting apparatus is being placed at three lighthouses in Chesapeake bay and the radio receiving apparatus and direction finder installed on a lighthouse tender. Three lighthouses are used, so as to give comparative information on different types of modern transmitting equipment and to determine which is the best suited for this work. The apparatus is of special types developed by the bureau as a result of some of its researches on radio problems during the war.

New Shipping Firms

During November, 23 new shipping companies were organized with a total capital of $52,700,000 according to the New York *Journal of Commerce*. This is the highest total for any month since June, 1919, when the amount invested was $55,550,000. The average indicated investment per company in November was $2,291,304 compared with $866,851 in October, $1,167,713 in September, $2,947,737 in August, $1,699,400 in July, $2,621,400 in June, $866,000 in May, $300,000 in April, $618,000 in March, $800,000 in February and $443,000 in January.

The following table gives the capitalization of new ship firms during November and month by month for the last 23 months divided between builders and operators:

1919	Total	Ship-building	Other shipping
January	$ 7,525,000	$5,390,000	$ 2,435,000
February	6,400,000	.....	6,400,000
March	9,276,000	4,500,000	4,776,000
April	2,400,000	1,000,000	1,400,000
May	17,200,000	600,000	16,600,000
June	55,550,000	150,000	55,400,000
July	42,485,000	2,850,000	39,635,000
August	55,950,000	4,000,000	51,950,000
September	40,870,000	5,750,000	35,120,000
October	23,405,000	5,155,000	18,250,000
November	52,700,000	500,000	52,200,000
1918			
January	21,274,000	6,650,000	14,624,000
February	5,330,000	1,050,000	4,280,000
March	8,900,000	4,050,000	4,850,000
April	7,895,000	3,950,000	3,945,000
May	8,650,000	8,350,000	300,000
June	1,900,000	1,575,000	3,251,000
July	10,730,000	6,075,000	4,655,000
August	11,200,000	3,625,000	7,575,000
September	30,879,000	5,250,000	25,629,000
October	2,675,000	600,000	2,075,000
November	1,059,000	500,000	550,000
December	9,873,000	3,000,000	6,870,000

During October, 27 new shipping companies were organized with an aggregate capital of $23,405,000. This was the lowest total for any month since last May. During September 35 new companies were formed with a capital aggregating $40,870,000.

The following table gives the capitalization of the new firms incorporated in November, October and September:

NOVEMBER, 1919

American Jugoslav Steamship Co., Del.	$ 5,000,000
Astmanco Navigation Co., Del.	500,000
Armenian Steamship Corp., Mass.	100,000
Atlantic Ship Salvage Corp., Del.	750,000
Columbus Steamship Co., Del.	500,000
Galena Navigation Co., Del.	1,000,000
Interseas Shipping Corp., N. Y.	100,000
Interocean Shipbuilding & Navigation Co., Del.	500,000
Imperial Shipping Corp., Del.	5,000,000
Kinsley Steamship Lines, Inc., Del.	10,000,000
Lonetur Steamship Corp., N. Y.	100,000
Magellan Steamship Corp., Del.	2,600,000
Merry Mount Steamship Corp., Me.	500,000
New York Oceanic Co., N. Y.	250,000
Nichols Towing Co., N. Y.	100,000
North Atlantic Marine Corp., Del.	1,000,000
Nameaug Steamship Corp., Me.	500,000
Pioneer Steamship Corp., Del.	16,000,000
Stone–Richardson Corp., N. Y.	200,000
States Steamship Co., Del.	500,000
Tampa-St. Petersburg Transportation Co., Del.	200,000
Tollard Steamship Corp., Me.	500,000
Worcester Steamship Corp., Me.	500,000
Total	$52,700,000

OCTOBER, 1919

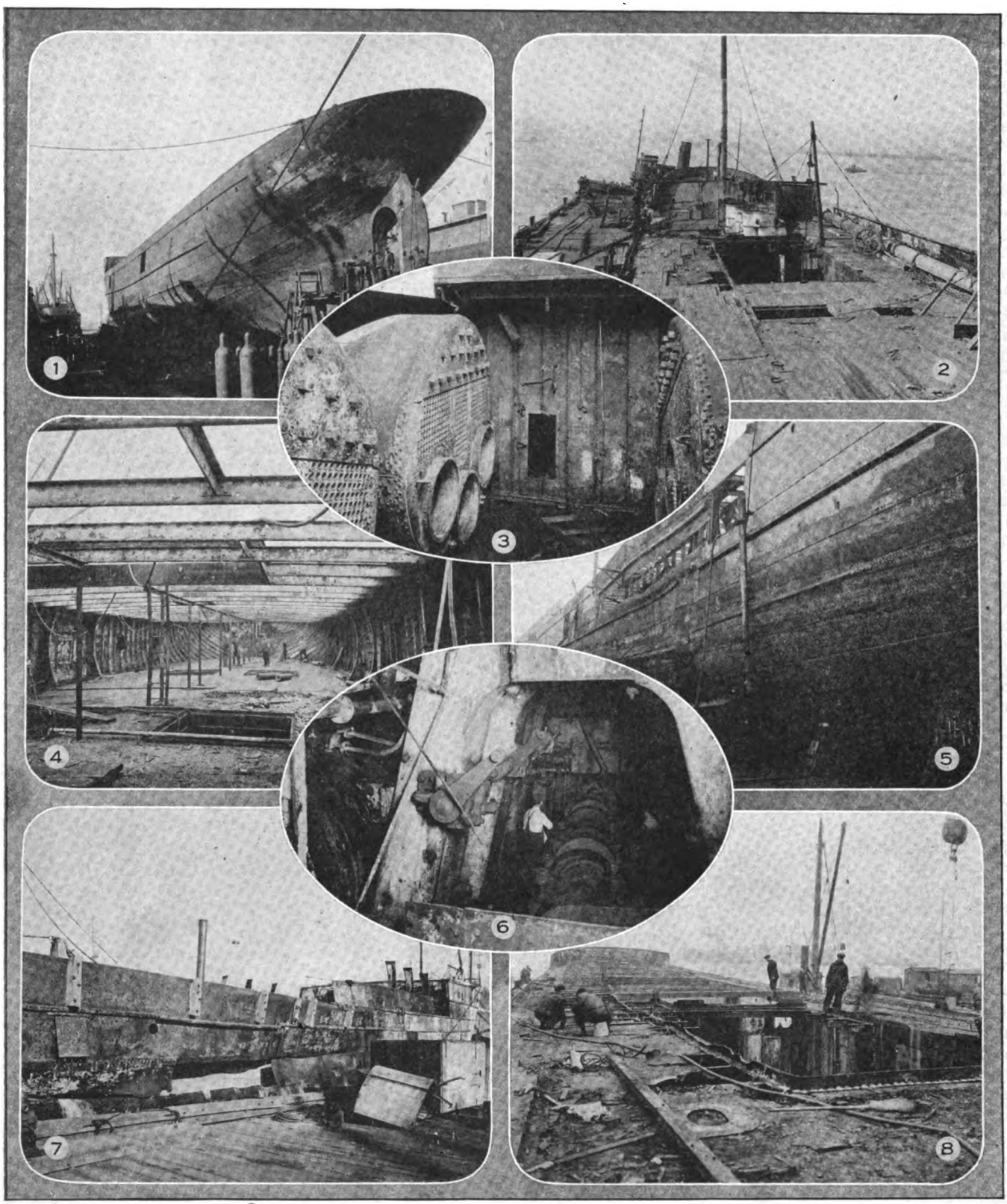
American Northern Norway & West Indies Line, Inc., Del.	$500,000
American-Lloyd Transport Co., N. Y.	1,000,000
Betsy Bell Steamship Corp., Me.	500,000
Black Diamond Steamship Corp., Del.	250,000
Crotois Shipping Corp., N. Y.	50,000
Chancook Steamship Corp., Me.	500,000
Cary-Davis Tug & Barge Co., Seattle, Wash.	100,000
Cragin & Co., Del.	1,000,000
Dry Docks & Ship Repairs Corp., The, Del.	5,005,000
Delco Steamship Co., Del.	500,000
Fort Morgan Steamship Co., N. Y.	500,000
French-American Steamship Co., Del.	3,000,000
Gould Shipping & Sailing Corp., Del.	500,000
Gunstan Hall Steamship Corp., Me.	500,000
Inter-Coast Steamship Co., Mass.	2,000,000
International Chartering Co., Del.	100,000
Jacksonville Shipping Corp., Fla.	50,000
Knickerbocker Marine Navigation Corp., N. Y.	100,000
Manhattan Ship Yards Corp., Del.	150,000
North Pines Steamship Co., Del.	300,000
Peninsular Shipping Co., Del.	50,000
Robinson Shipping Co., Del.	1,500,000
Roman Steamship Co., Del.	250,000
Stern Traders' Corp., Del.	2,000,000
United Shipping Co., Del.	2,500,000
Union Lloyd Line, Inc., N. Y.	100,000
Warner Steamship Co., Del.	400,000
Total	$23,405,000

SEPTEMBER, 1919

Adelaide Navigation Co., N. Y.	$100,000
Atlantic Adriatic Steamship Corp., N. Y.	100,000
A.-Z. Navigation Corp., Del.	240,000
All-Seas Shipping & Forwarding Co., N. Y.	50,000
Blanca Shipping Corp., Wash.	50,000
Baltimore Steamhsip Co., The, Del.	550,000
Brooklyn Ship Repair Co., Del.	750,000
Baltimore Ship & Com. Corp., Md.	500,000
Baltimore Steamship Co., The, Del.	550,000
C. C. Navigation Corp., Del.	300,000
Crescent Steamship Lines, N. Y.	1,000,000
Coyote Steamship Co., N. Y.	250,000
Diamond Steamship Co., Del.	1,000,000
Franco-Boston Navigation Co., Mass.	50,000
Gottschau Steam Motors Co., Del.	5,000,000
Gerold Steamship Corp., Del.	900,000
Georges Creek Steamship Co., N. J.	600,000
Lydia Steamship Co., N. Y.	500,000
Landers & Van Praagh, Inc., Del.	50,000
Morgan-Haig Shipbuilding Corp., N. Y.	100,000
Murphy Shipbuilding Co., Mass.	80,000
Mazama Steamship Co., N. Y.	250,000
Northern Steamship Co., N. Y.	100,000
Newman, Oliver P., Shipping Corp., Del.	100,000
Olympia Towing Corp., N. Y.	50,000
Patricia Transportation Corp., Del.	100,000
Ronael Shipping Corp., The, N. Y.	50,000
Standard Steamship Corp., Del.	500,000
Sacramento Steamship Co., The, N. Y.	500,000
Tampa Interocean Steamship Co., Fla.	300,000
U. S. Mail Steamship Corp., N. Y.	100,000
U. S. Transport Co., Inc., Me.	25,000,000
Vanada Steamship Co., Me.	500,000
Wyman Steamship Corp., N. Y.	50,000
Windward Island Line, Inc., Ala.	100,000
Total	$40,870,000

Digitized by Google

Latest Marine News in Pictures



REFITTING AN OLD SPANISH WAR TROOPER, THE POWHATAN, THAT HAD RESTED LONG ON THE BOTTOM OF CHESAPEAKE BAY, AT THE MORSE DRY DOCK & REPAIR CO. FIG. 1—HOW THE VESSEL APPEARS IN DRYDOCK. FIG. 2—DEBRIS AND WRECKAGE CLEARED FROM THE DECKS PREPARATORY TO REFITTING. FIG. 3—PART VIEW OF THE BOILER ROOM. FIG. 4—VIEW BETWEEN DECKS LOOKING TOWARD THE VESSEL'S STERN. FIG. 5—GETTING READY TO SCRAPE AND PAINT THE POWHATAN'S BOTTOM. FIG. 6—THE ENGINES WERE COMPLETELY DISMANTLED BEFORE ENGINE REPAIRS WERE BEGUN. FIG. 7—BATTERED PLATES CAUSED BY RAMMING THE VESSEL BEFORE SHE SUNK. FIG. 8—DECK VIEW SHOWING REPAIR WORK IN PROGRESS—THIS VESSEL WAS SALVED BY ROBERT HASLER BROS. AND MOORE & McCORMACK. SHE HAS SINCE PASSED OUT OF THEIR HANDS INTO THE POSSESSION OF THE COAST STEAMSHIP CO. WORK AT PRESENT BEING DONE ON THE VESSEL IS FOR FINDING OUT EXACTLY WHAT HER VALUE IS. FINAL PLANS FOR REFITTING HAVE NOT YET BEEN COMPLETED ALTHOUGH IT IS AGREED THAT SHE WILL BE RETURNED TO THE COASTWISE PASSENGER SERVICE

Digitized by Google

Photographs From Far and Near

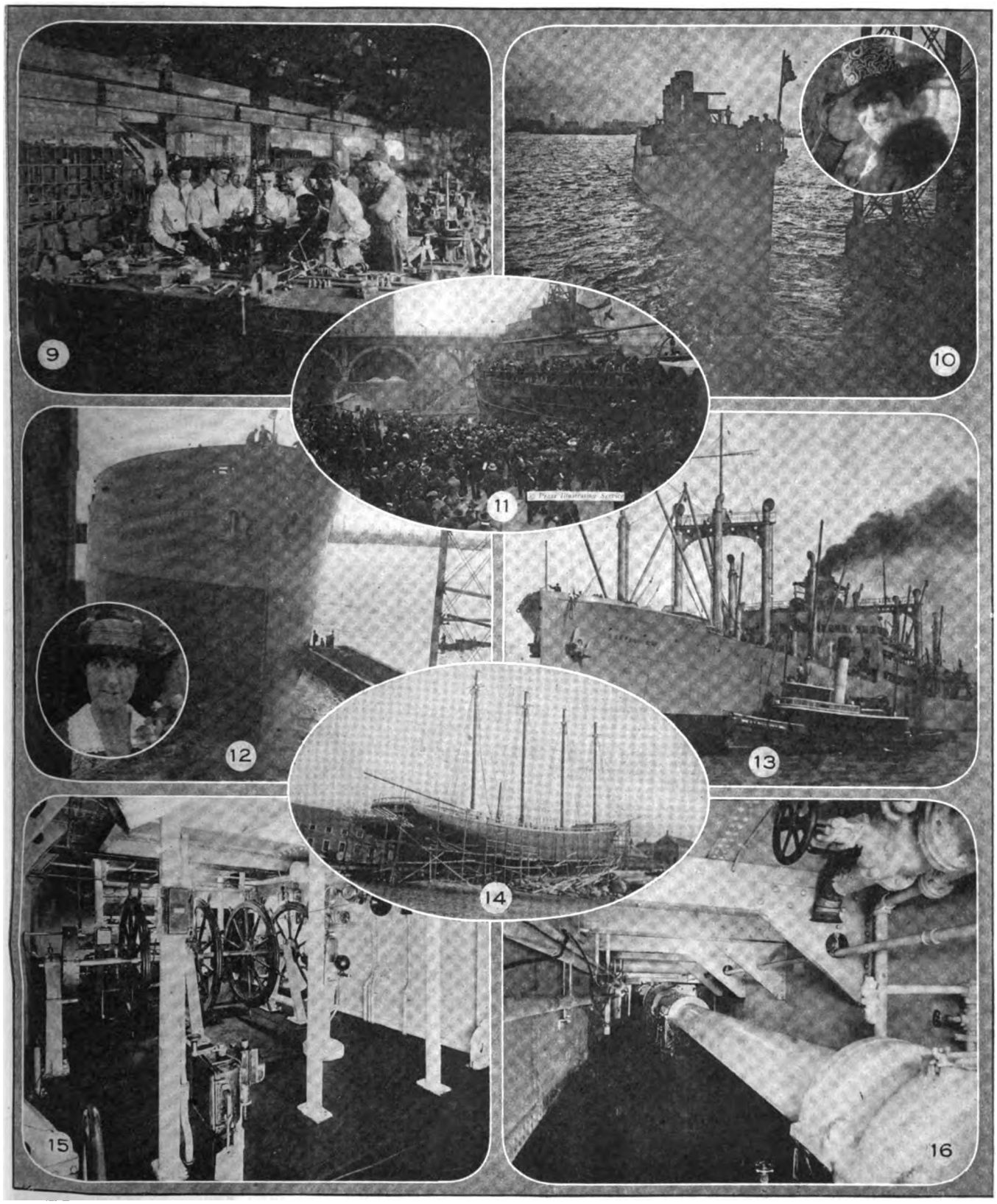


FIG. 9—GOING TO SCHOOL AT THE WESTINGHOUSE WORKS—THESE MARINE ENGINEERS ARE TAKING A TURBINE GOVERNOR APART. FIG. 10—TORPEDO BOAT DESTROYER SANDS TAKING THE WATER AT THE NEW YORK SHIPBUILDING CORP.—THE SMALL ILLUSTRATION SHOWS HER SPONSOR, MRS. JAMES K. SANDS, WIFE OF REAR ADMIRAL SANDS. FIG. 11—YARMOUTH, A BLACK STAR LINE SHIP OPERATED BY NEGRO INTERESTS —SHE WILL RUN BETWEEN NEW YORK AND SOUTH AFRICA. FIG. 12—DEFENDER LEAVING THE WAYS AT THE NEW YORK SHIPBUILDING CORP.—THE SMALL ILLUSTRATION SHOWS HER SPONSOR, MRS. H. C. SADLER, WIFE OF THE WELL KNOWN NAVAL ARCHITECT AND CONSULTING ENGINEER. FIG. 13—UNITED STATES ARMY TRANSPORT SOUTH BEND BEING TOWED TO THE BALTIMORE DRY DOCKS & SHIP BUILDING CO.'S LOWER PLANT TO TAKE ON A BIG COAST DEFENSE GUN CONSIGNED TO MANILA. FIG. 14—WOODEN SCHOONER JAMES E. NEWSON ON THE WAYS AT BOOTHBAY HARBOR. FIG. 15—AUXILIARY STEERING ROOM ON THE U.S.S. NEW MEXICO. FIG. 16—STARBOARD INBOARD SHAFT TUNNEL ON THE U.S.S. NEW MEXICO

Digitized by Google

Architects and Engineers Meet

Progress in Design and in Engineering Practice Disclosed at New York Meeting—How Engineers Met War Problems

ABILITY and skill of American engineers and naval architects in meeting abnormal conditions brought about by the emergencies of modern warfare was graphically revealed in New York in November. The occasion was the twenty-seventh annual meeting of the Society of Naval Architects and Marine Engineers held on Nov. 13-15. Evidence was furnished in papers dealing with such subjects as expansion of shipyards, nonrolling passenger liners and the buoyancy and stability of troop transports. The technical topics discussed covered a wide field embracing such subjects as propulsive efficiency of single screw cargo ships, standardization in the design of cylindrical boilers, developments in high vacuum apparatus, improvements in oiling systems for geared turbines and electric propulsion of merchant ships.

Many engineering developments held secret during the war, were revealed in the discussions. As an illustration, while presenting his paper on the propelling machinery of the LEVIATHAN, E. H. B. Anderson stated that the ship was not injured through vandalism but that the damages to her machinery were the result of ignorant handling by the German crew. "Most of the damage," he said, "was due to frictional heat caused by the machinery being out of alignment." Work of inspection on this vessel before refitting was fraught with constant danger as the workmen feared at any time to be the victims of bombs intentionally placed aboard by the Germans. Taken as a whole, the members of the society express an optimistic view of ship construction in the future.

The council of the society met on Wednesday afternoon, Nov. 12, and elected new officers to fill the vacancies caused by the society's constitutional limitations. Names of the newly elected officers are given in the accompanying box.

Outlines Shipbuilding Progress

The president of the society, Rear Admiral Washington L. Capps, prefaced the opening of the professional sessions on Thursday morning with an outline of shipbuilding. He pointed out that in 1900 only 80 steel vessels of 168,000 gross tons were built in American yards. In 1908 a total of 614,000 gross tons, of which 450,000 gross tons were steel, were built. That year the Great Lakes were the greatest contributors. The year 1915 witnessed a deplorable condition in American shipyards. But in 1919 new construction reached the total of 2,500,000 gross tons of steel vessels. The average monthly output of American yards began to reach 300,000 gross tons in 1918, and today, he said, the capacity of the yards is at least 5,000,000 gross tons annually. Admiral Capps pointed out that the signing of the armistice on Nov. 11, 1918, had little appreciable effect upon the quantity of vessel output in this country.

Membership Shows Increase

The secretary, Daniel H. Cox, reported that the membership of the society was 960 on Nov. 1, 1918, but had increased to 1393 on Oct. 31, 1919. In addition, the society elected 92 more active members and 45 associate members. The prosperous condition of the society was represented by the fact that the endowment fund had reached the total of $33,161.09.

In the professional papers read before the society the progress made in shipbuilding was reviewed and the economy of construction emphasized. The architects gave close attention to the work of designing economical cargo ships, and the advancement of the art of welding was discussed at some length. E. A. Sperry, of New York, inspired some discussion when he outlined the work he had done toward perfecting a nonrolling ship. In all, 15 papers were presented.

R. J. Wig read a paper, "Method of Construction of Concrete Ships," which was confined to a description of the methods employed in the construction of concrete ships for the United States shipping board. He emphasized the fact that the concrete ship is a practical structure and that if properly designed and built, will resist the normal stresses to which vessels are exposed while at sea.

"The concrete ship," said Mr. Wig, "has one inherent weakness. The 4-inch shell of such a vessel will not resist local impact of moderate intensity to the same extent as the shell of a steel ship of equal capacity. In cases of severe impact, where the resistance of the frames is of importance, it is believed that the concrete ship will show equal, if not a greater resistance, than a steel ship on account of its greater mass."

"Development of Shipyards in the United States During the Great War," was the title of an interesting paper read by Capt. R. E. Bakenhus, U. S. N. Captain Bakenhus brought out the fact that the problem of producing ships consisted of four principal elements, the financial, the development of much additional shipbuilding labor, the supplying of shipbuilding materials and the provision of plants for ship construction.

Captain Bakenhus said: "Before the beginning of the great war, that is in 1912 and 1913, there were in the United States 49 shipbuilding yards with an estimated number of 184 ways. By the fall of 1918, that is before the armistice was signed and before any of the wartime yards were dismantled, the number had increased to 243 yards with approximately 1202 ways. Of these yards, 117 were on the Atlantic coast, 64 on the Pacific coast, 29 on the Great Lakes, 32 on the Gulf, with one inland yard on the Cumberland river in Tennessee."

Creighton Churchill's paper, "Steel Ship Construction From a Management Viewpoint," was published in THE MARINE REVIEW for December, 1919. John Flodin read a paper, "An Analysis of the Isherwood System of Ship Construction," wherein he pointed out that among the advantages claimed by the Isherwood supporters are that ships built to this system are more easily cleaned and repaired and that ventilation is improved. He discussed the growth of this system of building and drew some interesting conclusions. Alfred J. C. Robertson read a paper, "Economical Cargo Ships," which appears on page 12 of this issue.

Nonrolling Ships Described

The subject of nonrolling passenger liners was interestingly set forth in a paper by Elmer A. Sperry. He described experiments that have been conducted to render passenger ships more stable while running through heavy seas. This is accomplished through a rapidly revolving gyroscope placed aboard the ship. Mr. Sperry

Digitized by Google

pointed out that recent installations have proved that a ship can be guaranteed against all rolling which will bring about a great degree of comfort in ocean traveling. He states that the gyro-stabilizer works entirely independently of the motion of the vessel and that as it delivers full counter motions to the ship it is free to deal directly with the wave slopes themselves, that is, with the rolling increments of the sea as they are in the process of developing, even before the incipient rolling has set in. "The device," he stated, "holds the ship on an even keel apparently without effort."

In his paper, "Submarines in General—German Submarines in Particular," Commander E. S. Land, U. S. N., emphasized the fact that the German submarines destroyed about 15,000,000 tons of shipping and killed approximately 16,000 persons during the war. Throughout the last three months of war, they destroyed about 1,000,000 tons of ships. "It was only in October, 1918," he stated, "that the construction of allied vessels covered the current losses caused by submarines."

In summing up the results of a series of experiments relative to propulsive efficiency of vessels, Commander William McEntee, U. S. N., in his paper, "The Propulsive Efficiency of Single-Screw Cargo Ships," said: "It appears safe to conclude that, for a well designed hull with a propeller running at about 90 revolutions a minute, a hull efficiency of 1.09 and a propulsive efficiency of 0.65 may be expected in a single-screw cargo ship."

Discusses Troop Transports

"Buoyancy and Stability of Troop Transports," was the subject of a paper presented by William Hovgaard. His paper dealt in particular with ocean-going transports such as those used to carry troops across the Atlantic during the world war. He drew attention to the fact that the number of troops carried on a transport often exceeded the number of passengers carried on a liner of the same size and that this fact, in connection with the urgency and vital character of military expeditions in general, made the problem of the safety of troop transports rank higher in importance than in the case of ordinary passenger vessels."

"The advantages of standardization of design in quantity production are so obvious that during the recent emergency, the principle of standard designs was applied with more or less success to all the many implements of war manufactured in this or in the allied countries," was a point brought out by Henry C. E. Meyer in a paper, "The Application of Standardization and Graphical Methods to the Design of Cylindrical Return Tubular Boilers." He emphasized the fact that steam space cannot be sacrificed indefinitely nor can a boiler that is inaccessible have a long and satisfactory life. "Steam space," he said, "is undoubtedly one of the primary requisites to the proper performance of boilers and it would appear that for ocean-going vessels, an average practice is to keep the center of the upper row of tubes at one-sixth of the diameter of the boiler above the center line, whereas for coastwise or harbor vessels, this distance is approximately one-fifth of the diameter of the boiler."

G. L. E. Kothny read a paper, "New Developments in High Vacuum Apparatus," in which much interesting data was set forth. "The steam air ejector," he said, "is a compressor in which the air to be compressed is entrained by one or more steam jets which move through the entrainment space at a high velocity. The entrainment is made by friction. The efficiency depends upon the magnitude of three losses, the friction losses in the expansion nozzle, the impact losses during entrainment and losses in the diffuser."

Results of experiments in launchings at Mare Island navy yard were discussed in a paper, "Launching of Ships in Restricted Waters," by Capt. H. M. Gleason, U. S. N., and Lieut. Com. H. E. Saunders, U. S. N. They pointed out that various methods have been used successfully to check vessels on leaving the ways such as the breaking of rope stops, the use of wood friction wedges, fitting a mask to the vessel's stern, dropping anchors, slewing the stern with the channel by letting go stern anchors and by the use of heavy chain drags.

Gives Complete Description

"The Propelling Machinery of the U. S. S. LEVIATHAN," Ernest H. B. Anderson's paper, gave the first complete technical description of the machinery on this vessel. J. Emile Schmeltzer and B. G. Fernald read an instructive paper, "Standard Lubricating Oil System for Geared Turbines." "Electric Propulsion of Merchant Ships," was the subject discussed by W. L. R. Emmet. He pointed out that the use of electricity for propelling ships was first advocated in the case of large war vessels. In concluding his paper, he said: "The history of the electrical industry has repeatedly shown that persons who have not used electrical apparatus assume that its operation requires a high order of skill and expert knowledge. A vast amount of experience has repeatedly shown that this is not so.

"Conductor circuits," he said, "are much simpler mechanically than are pipes and mechanical motions and the electrical machinery is simply a combination of electric circuits with motion of rotation. The connections are easily shown by diagrams and but little mechanical skill is required to make them."

On Saturday, Nov. 15, the members took an excursion to the Newark, N. J., yard of the Submarine Boat Corp. where they witnessed a launching. At the annual banquet Saturday evening, a number of interesting speeches were delivered, including a discussion of "Shipbuilding and Commerce," by Homer L. Ferguson, president, Newport News Shipbuilding & Dry Dock Co.

New Officers

President

(Elected in 1918 for 3 years beginning Jan. 1, 1919.)

REAR ADMIRAL W. L. CAPPS, U. S. N.

Vice Presidents

Term expiring Dec. 31, 1922

A. P. NIBLACK, Admiral, U. S. N.
R. M. WATT, Captain, C. C., U. S. N., Industrial Manager, Norfolk Navy Yard.
H. D. GOULDER, Proctor in Admiralty, Cleveland.
C. P. WETHERBEE, Vice President, Bath Iron Works, Bath, Me.

Members of Council

Term expiring Dec. 31, 1922

J. H. LINNARD, Captain U. S. N., Bureau of Construction and Repair.
C. A. MCALLISTER, Vice President, American Bureau of Shipping.
W. L. R. EMMET, General Electric Co., Schenectady, N. Y.
J. H. GARDNER, Vice President, New England Steamship Co.
W. J. DAVIDSON, President, Staten Island Shipbuilding Co., Port Richmond, N. Y.
H. P. FREAR, Bethlehem Shipbuilding Corp., Ltd., South Bethlehem, Pa.

Associate Members of Council

Term expiring Dec. 31, 1922

R. A. C. SMITH, President, American Mail S. S. Co., New York.
ALBERT W. GOODRICH, President, Goodrich Transportation Co., Chicago.

Executive Committee

STEVENSON TAYLOR, President, American Bureau of Shipping.
ANDREW FLETCHER, President, W. & A. Fletcher Co., Hoboken, N. J.
W. M. MCFARLAND, Babcock & Wilcox Co., New York.
F. L. DUBOSQUE, Pennsylvania Railroad Co., New York.
J. W. POWELL, Bethlehem Shipbuilding Corp., Quincy, Mass.

Secretary

DANIEL H. COX, Naval Architect, New York.

Committee on Papers

W. M. MCFARLAND,
F. L. DUBOSQUE,
H. L. ALDRICH.

Digitized by Google

Big Vessel for African Route

Modern Passenger Steamer Designed for South African Trade—Completes Ore Dock in Chile — Marine Insurance in Argentina

HARLAND & WOLFF, LTD., Belfast, Ireland, launched recently the passenger steamer ARUNDEL CASTLE for the Union Castle Mail Steamship Co., Ltd., London, for its South American mail and passenger trade. The ARUNDEL CASTLE has accommodations for 273 first-class, 224 second-class and 566 third-class passengers.

The vessel and machinery were constructed under board of trade survey for passenger and safety certificates, also to the requirements of the British emigration survey and home office requirements. Her principal dimensions are: 650 feet long, 72 feet beam, gross tonnage over 18,000. She will be 2-masted fore and aft schooner rigged, with a straight stem and a cruiser stern. The hull is of strong construction with lower, middle and upper decks, continuous all fore and aft, and orlop deck forward and aft of boiler spaces, bridge and poop decks joined, top gallant forecastle, promenade and boat decks and navigating bridge.

Fittings Are Complete

The vessel is subdivided into 12 watertight compartments by 11 watertight bulkheads. The double bottom extends right fore and aft. The accommodation for passengers will be modern and convenient. The first-class dining saloon, reception room and children's saloon are situated amidships on the middle deck. The reading room on the boat deck will have large vertical sliding windows. The lounge is at the fore end of the promenade deck. The smoking room is also on the promenade deck. A veranda will be arranged on this deck. There will be a gymnasium on the promenade deck for seniors, and a separate one for juniors. A new feature will be the swimming bath, also on the promenade deck.

The first-class staterooms on the bridge deck are single berth and two berth cabins, with vertical sliding windows, beds of cot type enameled white, separate folding lavatories, chests of drawers and wardrobes for each passenger. The staterooms on the upper deck are arranged on the tandem principle, avoiding inside rooms. They are furnished with cot and pullman beds. The second-class dining saloon is on the middle deck, with second-class children's saloon forward. The smoking room and library are on the bridge deck. There is also a veranda on the promenade deck for second-class passengers. The second-class staterooms are situated on the upper and middle decks. The third-class passengers are well provided for. There is a large general room on the poop deck, and immediately abaft this is the smoking room. The dining saloon is on the upper deck. The crew comprises about 400 men, the accommodation for whom will be arranged on the latest principle.

The vessel has a large cargo and refrigerated capacity. She is propelled by twin screws which are driven by two sets of geared turbines, each set consisting of a high and low pressure unit. The steam required for the machinery is generated at a pressure of 220 pounds per square inch in 11 cylindrical boilers working under natural draft. All the auxiliary machinery is worked independently of the main engines. A complete electrical installation will be fitted. There will be four turbogenerators situated in the engine room, and in addition to this a diesel engine driving a 75 kilowatt dynamo is installed well above the water line for supplying light and power in case of emergency.

The steering gear is of the quadrant type operated by two electric motors. It is controlled by electric telemotor from the wheelhouse and by hand gear from the docking bridge, aft. The watertight doors will be electrically operated and can be controlled by the captain from the bridge. The vessel will have a submarine signalling apparatus and wireless telegraphy.

The ARUNDEL CASTLE is built on fine lines and she is expected to prove a speedy vessel. The numerous innovations for the comfort and convenience of passengers will make her a popular craft and her performance is looked forward to with interest by those who follow maritime affairs closely.

Completes Ore Dock

The iron ore dock of the Bethlehem-Chile iron mines, at Cruz Grande, Chile, construction of which was held up by the war, has just been completed. The dock has capacity for 30,000 tons of ore and is provided with 17 spouts, by which all 17 hatches of the standard 20,000-ton ore boat of the company may be fed simultaneously. The loading time is expected to be three or four hours per vessel on the average, as, although the actual loading time is to be much less, the discharge of the water ballast requires considerable time. The dock is similar to the ore docks in Lake Superior. It is nearly 500 feet long and is loaded by discharging the ore from hopper cars at the top of the dock. The height of the dock from mean low tide to top of rail is 120 feet.

Argentine Insurance

In Argentina, marine insurance companies depend largely on local river and coast traffic for business. This local business, called cabotaje, includes the movement of native raw materials from outlying districts to tidewater and the reshipment of imported goods to the interior and along the coast.

Another important branch of the business deals with the insurance of reshipments of imported goods to the West coast of South America, Japan, China, South Africa, etc. At the present time there are 24 insurance companies operating in Argentina. Of these 15 are local and nine foreign. None, however, is devoted wholly to marine risks.

A foreign insurance company cannot begin operations in Argentina until it has deposited Argentine government bonds to the value of approximately $127,380 with the Argentine government. This entitles the company to open a branch office to operate in one class of risk only. Operations in another class of risk call for the deposit of like bonds to the value of approximately $63,690 and for each additional class of risk further deposits of approximately $42,460 are required. Under the present law, only Argentine government bonds are accepted for deposit but it is expected that a bill now before the Argentine congress will be approved which will permit the deposits to be made in Argentine currency.

The penalty for noncompliance with the law is quite severe—six to 12 months imprisonment. National insurance companies, that is those formed in Argentine, are not required to make these deposits but they are required to pay an annual license fee of from $850 to $2100 when they operate in one class.

Digitized by Google

Payne Outlines Ship Board Plans

Head of Shipping Board Favors Government Ship Operation to Educate Americans in Marine Field

BY JOHN BARTON PAYNE

THE purpose of the shipping board is to establish a permanent American merchant marine, ultimately resting on private enterprise and private capital, supported by the grain and cattle-growing farmers of the Mississippi valley and the West and the Northwest, by the cotton growers of the South, by the miners of the East and West and by the producing labor and capital of American manufacturing institutions.

If the American people are to maintain their present high standards of living and retain even approximately their present position in finance and trade, our annual surplus must be sold in foreign markets, and we cannot do this without ships—ships owned and controlled by Americans flying the American flag into every port of the world.

The war has given us ships. We now have 1300 shipping board vessels, operating 41 trade routes, carrying our products under our own flag into the important world ports. By the end of 1920 this number will be increased to some 2250. Sales of ships to Americans are being made, but the sales do not keep pace with the new launchings.

The problem of establishing a permanent merchant marine presses for solution. No question of government ownership is involved. The question is not between public and private ownership, but between American and foreign ownership. We want an established American merchant marine, how it shall be owned is less important. We desire that every ship now government owned shall be sold to and be privately owned and operated by Americans for Americans, but that will come later. Now the chief thing in hand is to create a merchant marine. Ships alone will not do this. Indeed, unless we have men, money and brains in the shipping business, ships may become a liability rather than an asset.

How, then, may a merchant marine be established? It cannot be done in a day. It cannot be done by legislation alone. It requires time, habit, growth and individual capacity, initiative and enterprise. Many seem to think the shipping board can do this by reducing the price of ships and instantly shipping men will spring up and all our ships will be bought by private owners, and, presto! a merchant marine is a fact. This is a serious error. A substantial reduction in price would undoubtedly sell some 300 of our best ships, but this would not touch the problem. Ships cannot be sold in large numbers until the country is prepared to buy them. It is not now prepared.

We have only a few successful shipping companies. They, however, insist that we reduce our prices and we would thereby be able to sell the ships. That this is a fallacy is of easy demonstration, as is also their claim that there is a world market price for ships.

There is no such market price. No other country has ships ready for immediate delivery, hence there can be no world market price. The demand for ships for present use cannot be met by building ships for future delivery; the need for tonnage is instant and pressing, and is now greater than ever before, and cargo rates are higher. We alone have ships for sale, ready for spot delivery. Our prices are based on a fair estimate of cost, and a regular schedule of prices and terms is maintained, the same to all persons.

When can we build ships cheaper? Certainly there is no indication here or abroad that labor and materials are getting cheaper. How, then, can ships be cheaper? England's costs are rising and she has no ships for sale. Indeed, she is in the market to buy ships. You ask, then: "Why don't we sell our ships?" Because we want to sell to our own people for use under our own flag, and our country has not yet begun to think in terms of ships. We have not acquired the ship habit. Who loans money on ships? Who of your acquaintances would buy a ship mortgage? Are your neighbors sending their boys to sea? These things must come to pass before we are a maritime nation, prepared to buy over 2000 ships.

The few American shipping companies now in the market cannot, and will not buy all our ships. To illustrate: We had a conference recently with one of the largest shipowners. He had urged congress to require us to reduce our price of $200 to $225 per ton, to $125 to $140 per ton. We asked him how many ships his companies would buy at his prices. He replied: "About 100." We then asked how many the entire shipping interests of the country would purchase. He replied: "About 200 more." We then asked: "How does that leave the government? We sell you 300 of our best hand picked ships at 40 per cent less than cost. We are left with more than 1800 ships of all sorts on our hands, which the government must operate in competition with the better ships of the private owners. That will not solve the problem. Your few companies with 400 or 500 ships do not make a merchant marine adequate to the needs of the country. Must the government, after selling you its best ships at much less than cost, less than you can possibly build them for, keep the poorer ships and operate them at this great disadvantage?" He admitted that his plan would not solve the problem, and that he was probably looking at it from his own, rather than the government's point of view.

What, then, is the solution? Congress should let it be understood that it will not compel the board to sell ships. Agitation to this end and keeps conditions unsettled and prevents sales. The hope that congress will compel us to sell the ships in a short time heads buyers off, hoping for low prices.

The shipping board must be left to deal with the problem. We are making a number of sales, and the demand at present prices is increasing, but much time must pass before the ships can be sold. No new enterprise involving billions of capital was ever established in a day.

My conclusion is, it is not possible to have a successful American merchant marine until the country grows into the ship habit.

(*a*) The American newspapers and magazines must arouse the thinking men among manufacturers, investment bankers, farmers and labor to the necessity for a merchant marine and must teach the people to think and act in the language of shipping. They must first understand, then they will act. Already great strides are being made. Even now, we have 300 firms or companies operating shipping board ships. They employ on land and sea nearly 60,000 men in this service. We maintain a recruiting service and schools to teach officers, engineers and sailors how to do the work, and fit them for the sea.

(*b*) Congress is giving the matter close attention, and besides the Greene bill, should pass a mortgage bill, sub-

Statement made by John Barton Payne, chairman of the shipping board, to the Southern Commercial Congress, Savannah, Ga., Dec. 8.

Digitized by Google

stantially like the one now before the merchant marine and fisheries committee, to guarantee investors a lien for the purchase price of the ships which will, in financial circles, have as much value as a railroad mortgage, and investment bankers and the public may freely invest in ship securities.

(*c*) American insurance is essential. Companies must be encouraged and new ones established, that we be not dependent on foreign companies for our ship insurance, as we are now. This is of great importance.

(*d*) The American bureau of shipping must be developed and strengthened, to the end that in all technical matters affecting shipping we may be independent of any foreign institution.

Meantime, with the aid of individual operators, we operate the ships with as much profit as unsettled conditions of the time permit, but nevertheless with a profit, and the work of creating an American merchant marine goes on.

These are the high lights. To accomplish this great task, all Americans of all classes must pull together. The tales of the sea must become the gossip of the nursery and of the fireside.

It is not possible for America to hide her head in the sand. Will she attempt a splendid but decaying isolation, or will she go down to the sea in ships, and, using her own Panama canal, unite the Americas, the Orient and the Occident, in friendly trade, and lend her aid toward an enduring peace?

May Legalize American Shipping Bureau

A virtual emancipation proclamation from the restrictions and limitations of foreign registry and ship survey methods has been offered the house of representatives for consideration. In a bill introduced by Representative Edmunds of Pennsylvania, all governmental departments are directed to recognize the American bureau of shipping in the classification of vessels. This throws down the gauntlet to the foreign bureau, particularly Lloyd's, with its great strength in the American underwriting and registry field, as well as that of Europe. The text of the bill, which is comprehensive in its provisions, follows: "Be it enacted by the senate and house of representatives of the United States, in congress assembled, that for the classification of vessels owned by the United States and for such other purposes as are the proper functions of a classification bureau all departments of the government and all commissions created by the government are hereby directed to recognize the American bureau of shipping as their agency, provided that the secretary of commerce and the chairman of the shipping board shall each appoint one representative who shall represent the government upon the executive committee of the American bureau of shipping and the bureau shall agree that these representatives shall be accepted by them as active members of such committee. Provided further, that the representatives of the government shall serve without any compensation with the exception of necessary traveling expenses."

Exploitation des Brevets Leparmentier, 90, Rue D'Amsterdam, Paris, France, advises THE MARINE REVIEW that the report that the French government has decided not to construct any more boats under this firm's system of construction, after finishing the first series of five hulls, is inaccurate. These ships are of the type of the cargo boat CAUCHY, the launching of which was described in the October issue. This system of construction is designed to make a vessel as nearly nonsinkable as possible, an important factor which the company emphasizes is not removed by the closing of submarine warfare, but is valuable in overcoming troubles from drifting mines, icebergs, derelicts and more usual marine accidents.

Plan Large Exhibit for Marine Firms

THE first large exposition for industries dependent on shipbuilding and shipping will be held April 12-17 in the Grand Central Palace, New York, by the National Marine league, an association of American manufacturers, shippers and business men. Exhibits at the exposition will feature American steamship lines, shipbuilding, ship chandlery, port equipment and loading facilities, marine engineering, training of officers and men to operate American ships, the operations of marine insurance companies and of banks engaged in financing foreign trade. Speeches will be made by prominent shipping men and public officials, marine lectures will be given by authorities and marine films shown.

In outlining the purpose of the exposition, P. H. W. Ross, president of the league, said: "With an adequate merchant fleet the threatened deluge of foreign-made goods which could wipe out our steady, profitable employment of capital and labor at home, can be stemmed and diverted to new foreign markets. If we are to retain national and individual prosperity and avoid commercial peonage to any foreign nation, we must make a concerted effort immediately to place the American merchant marine and the enormous industries connected therewith, in a position where they will not again dwindle to prewar insignificance.

"Two things are essential to this: The passing of legislation conducive to steady and profitable building and operating of ships, and the financing of these enterprises by investment in shipping securities. It is from the public, from the people, that these laws and investments must inevitably come. It is imperative, therefore, to reawaken in the American people their long dormant interest in the sea, to arouse their enthusiasm in their own great maritime possibilities and talents which once made them pre-eminent on the seven seas.

The National Marine league is a nonpartisan and nonpolitical organization. Its declared purpose is to promote America's great maritime power not for the benefit of any class but for the good of the country as a whole. Its tenets are American cargoes, mails and passengers carried in American ships, built, owned, operated and manned by Americans; ships classified and insured by American companies and repairs made in American yards by American industry.

August Belmont is chairman of the board of trustees of the league. Among the prominent members of its committee on invitation are: A. C. Bedford, E. L. Doheny, W. Averill Harriman, John N. Willys, Frank Waterhouse, J. Leonard Replogle, Ogden Mills, Sol Wexler, H. S. Firestone, H. F. Alexander and Howard Elliott.

In view of the increased number of American ships being repaired in European waters, William T. Turner has opened an agency for Crichton, Thompson & Co., Ltd., at 44 Whitehall street, New York. This company is agent for the following old established drydocking and ship repairing firms: Fletcher, Son & Fearnall, Ltd., London; C. & H. Crichton, Ltd., Liverpool; Wilton's Engineering & Slipway Co., Rotterdam; La Societe des Ateliers Terrin, Marseilles; Burmeister & Wain, Copenhagen.

Digitized by Google

November Ore Shipments

Shipments of iron ore from the Lake Superior district declined sharply during November, many boats having been laid up early in the month. The movement totaled 3,152,319 tons which, compared with 6,201,833 tons, the movement during October shows a decrease of 3,049,514 tons. In comparing the figures with those of November, 1918, when the movement totaled 4,279,025 tons, a decrease of 1,126,706 tons is shown. Total shipments to Dec. 1 are 47,130,733 tons. Comparison with the figures for the corresponding period of 1918 shows a decrease of 14,019,163 tons. Only a few cargoes were loaded during December. Shipments by ports follow:

Port	Nov., 1919	To Dec. 1, 1919
Escanaba	483,046	4,936,968
Marquette	251,149	2,132,935
Ashland	527,176	5,915,383
Superior	615,903	10,899,693
Duluth	875,584	16,821,209
Two Harbors	399,461	6,424,545
Total	3,152,319	47,130,733
1919 decrease	1,126,706	14,019,163

Lake Erie Receipts

Out of a total of 3,152,319 tons shipped from upper lake ports in November, Lake Erie ports received 2,592,612 tons, as shown by figures compiled by THE MARINE REVIEW. The balance on dock Dec. 1 was 10,454,843 tons against 10,376,509 tons on Dec. 1, 1918. Detailed figures are:

Port	Gross tons
Buffalo and Port Colborne	414,293
Erie	112,261
Conneaut	339,405
Ashtabula	496,752
Fairport	82,390
Cleveland	674,242
Lorain	188,059
Huron	40,689
Toledo	226,204
Detroit	18,317
Total	2,592,612

November Lake Levels

The United States lake survey reports the monthly mean stages of the Great Lakes for Nov. 19, 1919, as follows:

Lakes	Feet above mean sea level October	November
Superior	602.47	602.51
Michigan-Huron	580.63	580.43
St. Clair	575.39	
Erie	572.50	572.24
Ontario	246.35	246.11

Lake Superior is 0.04 foot higher than last month, 0.01 foot lower than a year, 0.01 foot above the average stage of November of the last 10 years, 1.00 foot below the high stage of November, 1900, and 1.01 feet above the low stage of November, 1879.

Lakes Michigan-Huron are 0.20 foot lower than last month, 0.67 foot lower than a year ago, 0.17 foot above the average stage of November of the last 10 years, 2.49 feet below the high stage of November, 1876, and 1.25 feet above the low stage of November, 1895. During the last 10 years the November level has averaged 0.2 foot lower than the October level, and 0.2 foot higher than the December level.

Lake Erie is 0.26 foot lower than last month, 0.11 foot higher than a year ago, 0.43 foot above the average stage of November of the last 10 years, 1.43 feet below the high stage of November, 1861, and 1.54 feet above the low stage of November, 1895. During the last 10 years the November level has averaged 0.3 foot lower than the October level, and 0.1 foot higher than the December level.

Lake Ontario is 0.24 foot lower than last month, 0.11 foot higher than a year ago, 0.56 foot above the average stage of November of the last 10 years, 1.71 feet below the high stage of November, 1861, and 2.70 feet above the low stage of November, 1895. During the last 10 years the November level has averaged 0.2 foot lower than the October level, and 0.2 foot higher than the December level.

To Lengthen Van Hise

The Great Lakes steamer CHARLES R. VAN HISE, upon which the United States shipping board spent nearly $3,000,000 cutting it in half and rolling it over on its side to try to get it through the Welland canal, is to be lengthened 96 feet at the Ashtabula, O., yard of the Great Lakes Engineering Works. This will make the VAN HISE 540 feet long and 9000 gross tons capacity. The steamer will be operated by the Morrow Steamship Co. and be renamed the A. E. R. SCHNEIDER.

The steamer C. W. KOTCHER, downbound with ore, went aground on Cedar reef in the upper Soo river recently. She was obliged to lighter part of her cargo before she could be pulled off. The tug IOWA and the lighter RELIANCE went to her rescue.

The ST. MIHIEL, second troopship to be constructed at Hog island, was launched during the latter part of November. The vessel was named in honor of the American soldiers who were killed in the famous battle of that name. Mrs. Frank T. Hines, wife of Brig. Gen. F. T. Hines, sponsored the craft. The ST. MIHIEL is a sister ship of the CANTIGNY. She is the sixty-seventh vessel launched at Hog Island and increases the yard's total output to 524,625 deadweight tons. The ST. MIHIEL is a steel ship, 448 feet long, 58 feet beam, 40 feet deep and registers 8000 deadweight tons.

Soo Canal Report

During November, 1299 vessels were locked through the Soo, carrying 5,134,496 net tons of freight. The aggregate vessel tonnage handled by the canal was 3,854,832. Compared with the freight movement for October, 9,713,319 tons, a decrease of 4,578,823 tons is shown. The movement during November, compared with the like period in 1918 when 8,513,511 tons were handled, shows a decrease of 3,379,015 tons. The November movement is also the lowest for a similar month of any year during the past five years.

The only items showing increases over October are westbound manufactured iron and steel and general merchandise. In November, 9112 tons of the former are reported against 5130 tons for October. With the latter item, the November movement was 71,431 tons against 68,325 tons for October. The wheat movement fell off 4,863,805 bushels, while iron ore shipments showed a decline of 2,769,918 tons.

The total canal tonnage figures for the past five years follow:

	Net tons
November, 1919	5,134,496
November, 1918	8,513,511
November, 1917	11,153,808
November, 1916	8,751,336
November, 1915	9,168,431

Of the total freight carried in November, 4,842,447 tons were carried through the American canal while the Canadian canal handled 292,049 tons.

The following tabulation gives the figures in detail up to Dec. 1, 1919 and 1918:

EASTBOUND

	To Dec. 1, 1919	To Dec. 1, 1918
Lumber, M feet B. M.	244,070	292,418
Flour, barrels	7,657,464	7,634,524
Wheat, bushels	95,927,803	100,553,924
Grain, bushels	48,550,618	27,136,928
Copper, net tons	55,974	81,320
Iron ore, net tons	46,744,597	60,330,953
Pig iron, net tons	3,997	.....
Stone, net tons	52,012	16,382
General merch., net tons	62,353	58,642
Passengers, number	28,392	17,290

WESTBOUND

Coal, soft, net tons	11,461,962	15,761,260
Coal, hard, net tons	2,343,846	2,153,300
Iron ore, net tons	137,315	141,036
Mfd. iron and steel net tons	111,542	37,217
Salt, net tons	92,989	80,007
Oil, net tons	387,023	334,134
Stone, net tons	319,108	385,627
General merch., net tons	460,886	417,932
Passengers, number	28,598	17,698

SUMMARY

Vessel passages, number	17,425	30,259
Registered tonnage, net	49,709,852	60,496,052
Freight		
Eastbound, net tons	52,420,879	65,367,056
Westbound, net tons	15,314,721	19,310,513
Total freight, net tons	68,036,350	84,677,569

Digitized by Google

Marine News in a Personal Way

Intimate Gossip About What Leaders in the Maritime World Are Doing

ARNOLD A. SCHANTZ is now president of the Detroit & Cleveland Navigation Co., the largest passenger ship operator on fresh water. Mr. Schantz in 33 years has risen from a country boy in a small Ohio town to his present position. He is a typical example of a self-made man who has succeeded through persistent surmounting of obstacles. He was born in Galion, O., in 1861. His chief hobby all his life has been work. Mr. Schantz began his working career when 12 years old. At that time he lived in Mansfield and carried papers in his spare time out of school. When 16 years old, he left school and began work in a grocery store. Later he went to work at the Mansfield post office where he gained the position of general delivery clerk. Later he was promoted to the position of superintendent of carriers. But he was not satisfied—he wanted to get into the transportation business. He wrote to railroad representatives and arranged to receive commissions for turning over business to them. After he had accumulated $200, he chartered a train and advertised an excussion to the Soldiers' home in Dayton, O. This venture netted him a profit of $80. Then he chartered a train on the Pennsylvania railroad and ran an excursion to Lakeville, O., making a profit of $100. The same summer he ran a third excursion which netted him $112. These experiences served as the basis for shaping his life work. His first experience on water came about in 1879 when, being in Cleveland, he sold his ticket for the return trip and bought another over the Detroit & Cleveland Navigation Co.'s route. The Great Lakes appealed to him and he began at once to organize parties to take outings over the waterways. This activity brought him the appointment as local agent for the company at Mansfield, O. The following year, he conducted 34 persons up the Great Lakes to Mackinac island for the purpose of camping out, this being the first of such parties organized. While he was on a subsequent trip, the local passenger agent at Detroit died, and Mr. Schantz was offered the position which he accepted. Here he set to work to learn the numerous details of the transportation business. In 1884, he became general western traveling agent, in 1891 assistant general passenger agent, and in 1892 general passenger agent. In 1902 he was made general superintendent and passenger traffic manager and a member of the board of directors. In 1907 he was appointed general manager and in 1913 vice president, which position he held until he was made president.

* * *

RALPH H. BOYD, well known in Seattle shipping circles, recently resigned his position as chief clerk of the Merchants Exchange of Seattle. Mr. Boyd will enter business on his own account in Portland, Oreg. He is succeeded by G. S. ATWOOD, who has been chief clerk of the towboat department for the Skinner & Eddy Corp., Seattle.

ARNOLD A. SCHANTZ
Recently elected president of the Detroit & Cleveland Navigation Co.

* * *

CAPT. HARRY HARGROVE has been made port captain of the Mobile Shipbuilding Co., Mobile, Ala.

* * *

GEORGES SCHRIMPF, formerly manager of the shipping department of the French high commission in the United States, has been appointed manager for France of the France & Canada Steamship Corp., New York. For 16 years, Mr. Schrimpf was manager of the Constantinople office of the Compagnie Fraissinet, Marseilles, France. While a member of the French high commission, he made his headquarters in New York. This connection terminated in January, 1918, and until his present appointment, he was general agent of the Compagnie Chargeurs Reunis, Bordeaux, France.

* * *

MORRIS M. WHITTAKER, for 25 years a marine and naval architect, was recently appointed general manager of the Northeastern Shipbuilding & Transportation Co.'s yards, Freeport, Me. The new company has an authorized capital of $1,500,000.

* * *

HERBERT O. DUNN, rear admiral commanding the first naval district, has returned to duty in Boston, following two months' work with the board at Washington, appointed by Secretary Daniels to select naval officers for promotion.

* * *

JAMES R. JACK, for 18 years manager of the Denny shipbuilding yards at Dunbarton on the Clyde, Scotland, has been added to the staff of instructors of the naval architects in the Massachusetts Institute of Technology. The acquisition of Mr. Jack follows a general policy of the institute to make its naval course as practical as possible.

* * * .

RODNEY D. CHIPP, formerly manager of the Vulcan Trading Co., has been appointed manager of the newly formed Forbes-Perkins Co. which will engage in foreign trade. The new company, which has a capital of $1,500,000, has its home office at 84 State street, Boston.

* * *

CHESTER T. MINKLER of the Newport torpedo station, in a letter recently sent out by the navy department, has been given the credit for inventing and developing the depth charge used so successfully against the German submarine.

* * *

LIEUT. JULIUS P. BROWN of the marine corps has been ordered to Pekin, China, where he will serve with the American legation.

Digitized by Google

Marine News in a Personal Way

Intimate Gossip About What Leaders in the Maritime World Are Doing

GEORGE E. WALTER has been appointed manager of Gueret, Jacks & Partners, Inc. This is a recent corporation formed in Seattle with the object of operating steamship lines. The new corporation is one of two organized in the United States by a combine of influential Scotch and English merchants, shippers and colliery owners. The other corporation was organized in Delaware and has its headquarters in New York. The Seattle corporation will look after the transportation interests of the British firms on the Pacific coast. Mr. Walter recently arrived in Seattle from London where he was connected with shipping interests for a number of years. For a period of 10 years he was chartering manager for Sir John Ellerman, London, who controls a large fleet. Mr. Walters announces the establishment of five new steamship lines from Seattle and San Francisco to the United Kingdom, Belgium, Italy, Japan and India. These lines, when established, will be represented in the United States by Gueret, Jacks & Partners.

* * *

L. A. CHOLOT has been elected president of the Black Diamond Steamship Corp. This company has taken over the business of the Western Ocean Shipping Corp. Formerly Mr. Cholot was manager of European trades in the office of the assistant director of operations of the United States shipping board, New York.

* * *

CAPT. FRANK E. FERRIS, managing agent in New York for the United States shipping board, recently resigned to become vice president of the Export Steamship Co. With the retirement of Captain Ferris, the office of managing agent is done away with and the affairs of the shipping board will be taken care of by GEORGE W. STERLING, assistant director of operations.

* * *

A. E. NORDWALL has been appointed manager of the newly opened branch office of the Black & Decker Mfg. Co., Seattle. The company's home office is in Baltimore.

* * *

J. E. MILLER has been made manager of the Cunard-Anchor and Anchor-Donaldson lines' branch office in Atlanta, Ga. The Atlanta office was opened only recently.

* * *

S. M. WILCOX, formerly with the Kerr Steamship Co., has joined the staff of Trosdal, Plant & La Fonta, operators of shipping board vessels from the Gulf, with offices at 50 Broad street, New York.

* * *

VICTOR M. SMITH has been appointed agent for the Kerr Steamship Co. at San Francisco where offices recently were opened.

J. H. CUSHING
New director of operations, United States Shipping board

* * *

CAPTAIN DAVIDSON, who has represented the United Fruit Co. and the Imperial Fruit Steamship Co., Boston, at Belfast, Ireland, for the past 10 years, supervising the construction of new tonnage for these concerns, has been promoted to the position of associate manager.

* * *

CHARLES F. PATTERSON, Pittsburgh, has been appointed general counsel for the Emergency Fleet corporation. He succeeds MARK HYMAN, New York, who resigned recently. Mr. Patterson will make his headquarters in Philadelphia and will act as manager of the claim board which is acting on claims caused by the cancellation of wooden ship and other contracts. Formerly Mr. Patterson was assistant general counsel of the railroad administration while JOHN BARTON PAYNE, present chairman of the shipping board, was its general counsel. Mr. Patterson returned to the practice of law in Philadelphia after Mr. Payne left the railroad administration. ROBERT A. DEAN will continue to act as general counsel of the shipping board with headquarters in Washington.

* * *

F. W. SINRAM, who is general president of the American Gear Manufacturers' association, was elected president of the Van Dorn & Dutton Co., Cleveland, at a recent board meeting of the company. FRANKLIN SCHNEIDER was elected vice president of the company.

* * *

WILMER M. WOOD, who recently joined the forces of the Kerr Steamship Co. in the capacity of general freight agent, was for many years connected with the Pennsylvania railroad and since 1912 he has been traffic manager of the United States Cast Iron Pipe & Foundry Co., Philadelphia. Upon coming to New York to assume his duties with the Kerr lines, Mr. Wood resigned the presidency of the Philadelphia Traffic club. Although comparatively a young man, Mr. Wood has a wide acquaintance in traffic circles.

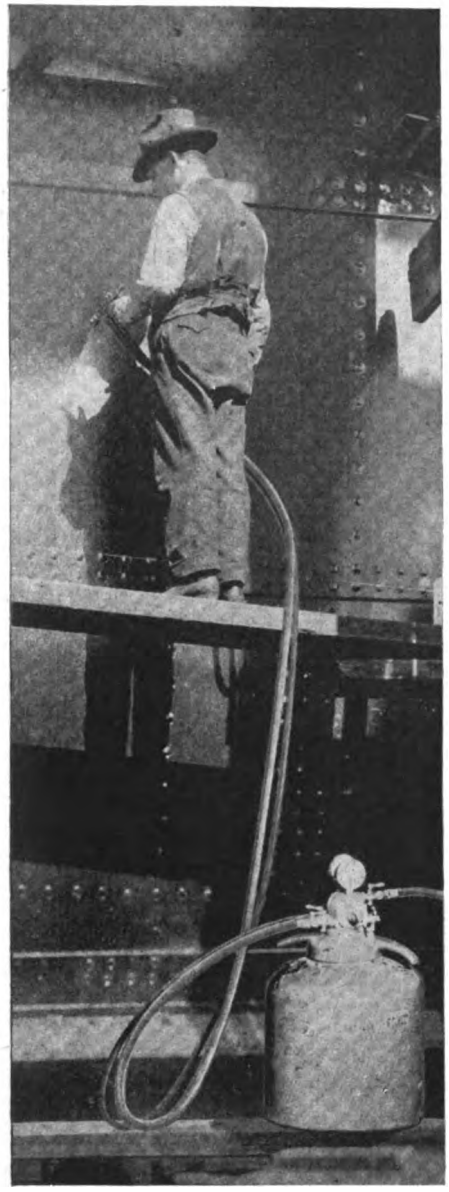
* * *

C. R. DOTY, treasurer of the Upson-Walton Co., Cleveland, has left for California on account of his health. He expects to be absent for a year.

* * *

JOHN M. COLE, Boston, was elected president of the American Association of Port Authorities at the convention held recently in Galveston, Tex. Other elected officers are: BENJAMIN THOMPSON, Tampa, Fla.; J. SPENSER SMITH, New Jersey; CAPT. B. C. ALLEN, Houston, Tex.; DOCTOR CHRISTENSEN, Seattle; and H. C. MCGWEN, Chicago, vice presidents; M. P. TENNEY, Montreal, secretary.

Digitized by Google



The paint gun makes a hard task easy

How Modern Vessels are Painted—II

BY FRED B. JACOBS

PAINTS and varnishes for ship work should be carefully selected if high-grade work is expected from the painting department. There are many grades of material on the market and an intelligent study of their merits is essential. The foreman painter should not be loaded up with low grade goods. It is not possible for all consumers of paint and varnish to submit samples to laboratory tests, but a guarantee of specifications should be obtained from the paint manufacturer.

All paints and varnishes, however, can be subjected to weather tests in cases where the consumer is willing to wait a few months before buying a large lot of the material. In weather testing paint or varnish, all that is necessary is to coat several pieces of wood which afterward can be exposed to the wind, rain or snow for several months. Tests of this kind are especially valuable on varnishes. With paint, however, even a poor quality of material will resist the weather for many months, so that it is impossible to draw conclusions from a comparatively short test.

In painting steel vessels, it is of the utmost importance that the surface is properly prepared before the first coat of paint is applied. In many shipyards the expression is often heard: "Oh, well, the first coat is bound to come off anyway so what is the use of spending time on the hull before painting?" As a matter of fact, the first coat is the most important of all and if the paint is properly mixed and applied correctly it will not come off.

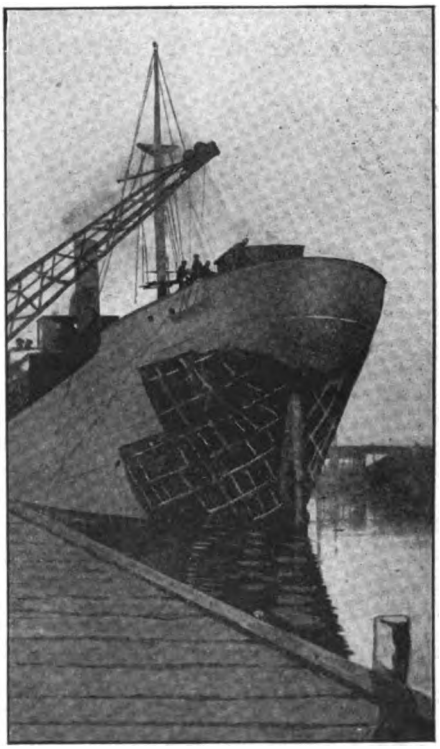
Two Preparation Methods Used

There as two distinct methods followed in preparing a steel or iron hull for painting. One is to allow the hull to rust as much as possible before the paint is applied. This method possesses a distinct advantage in that the rust forms under the mill scale which material in itself never rusts. As the rust forms, the scale is forced off, or loosened, so that it is easily removed by wire brushing just before applying the paint.

The other method is to immerse the plates in a solution of hydrochloric acid. This removes the scale. It is important to remove mill scale from ship plates as this material together with steel or iron forms a galvanic couple which gradually eats away the surface.

The outer surface of a ship's hull is divided into three parts, the underbody, the boot top and the top. Each of these requires a different grade of paint, as varying conditions must be provided against in every case. The first coat for all these sections, however, should be a good grade of red-lead paint mixed to a consistency where it will cover approximately 56 square yards to the gallon. Paint made by the formula given previously should have this spreading capacity.

The complete hull of a vessel, inside and out, steel decks, bulkheads, and all steel work that is to be ceiled or covered in any way should be given at least two coats of red-lead paint. As a matter of fact, if three coats are applied such a procedure will be a good investment as the life of the ship is further insured. These are under coats only. At least two finishing coats should be applied when two under coats are used. The finishing coats on parts that are exposed can, of course, be tinted to any color desired. The under coats should be red lead, however, as this material is definitely known to preserve iron and steel from the action of salt wa-



HULL PAINTING ABOVE THE WATERLINE IS OFTEN DONE AFTER THE VESSEL IS LAUNCHED

Digitized by Google

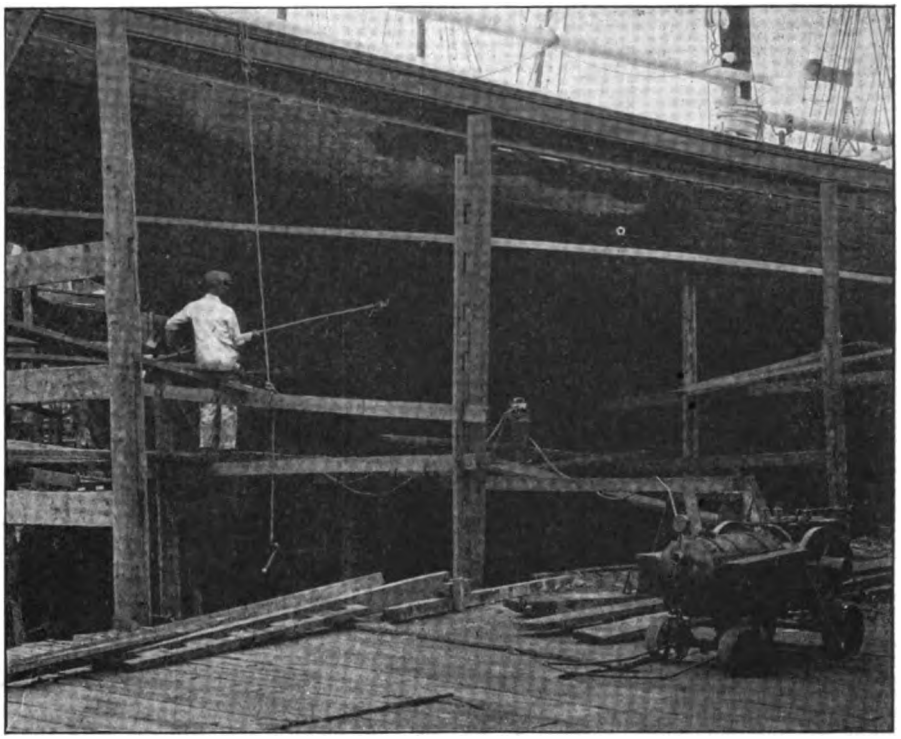
ter for an indefinite time if the material is properly mixed and correctly applied.

Confusion sometimes results as regards the number of coats applied to certain parts, because a third coat of paint often looks quite like a second one. For this reason, to avoid confusion, it is a good plan to make the initial coat pure red-lead paint. For the second coat, a little lamp black may be mixed in with the red lead without any serious detriment to the quality of the paint. For the third coat more lamp black can be added. With each coat of a different color no confusion should result.

After the purchasing agent has supplied the foreman painter with high grade materials, the sources of trou ble have not ended by any means. To begin with, the foreman painter is desirous of making the paint cover as much surface as possible and for this reason he often thins the paint unnecessarily—a little more drier is mixed in. Again, the crew working on the ship object to wet paint. The foreman painter may add more drier with the result that the life is burned out of the paint. A given standard should be maintained if the most efficient results are expected. The covering quality of the paint should be definitely known and paint should never be thinned simply for the purpose of making it stretch over a larger area than is consistent with the best results.

Painting is a trade calling for considerable skill—it isn't as easy as it looks. For this reason, common laborers should not be expected to turn out creditable work. During the war, when skilled labor was hard to obtain, untrained labor was often employed in ship painting. The results were manifest in many of the vessels turned out. As a matter of fact, in some cases the paint peeled off before the ships were delivered to the government. Whatever defense there was for utilizing common labor on this work during the war does not exist at the present time when skilled labor of all kinds is more readily had. It is poor economy to trust as important an operation as painting to those who do not understand the art of applying paint effectively.

After the first coat of red lead has dried, all rivet heads, flush seams and butts and in fact all exposed flush surfaces should be smoothed as occasion requires with a good rivet cement. The first coat should be allowed to dry thoroughly before the second is applied for if wet paint is applied over a painted surface that has not dried thoroughly, the under coat, being hermetically sealed against the air, has no opportunity to dry properly.



THIS EXTENSION ECONOMIZES THE TIME OF THE OPERATOR

All painting below the waterline, inside and out, should be finished before the vessel is launched. The finishing coats on the other parts of the vessel cannot, of course, be finished at one time as painting is going on about a vessel from the time she is launched until just before she is delivered. The boot top and top can be painted just as well after the vessel is launched as before, as regards the finishing coats and this rule, of course, applies to interior painting.

How Camouflage Paint is Applied

Camouflaging ships by painting them all colors of the rainbow in various designs was an innovation brought about by the war and dropped on its conclusion. The object of camouflaging a vessel is not to render it invisible, but to make it harder for an enemy craft to judge the vessel's size and her direction of travel. Camouflage designs are laid out by a camouflage artist on a small model on which the design lines and colors are designated. Sometimes the model is actually painted in the colors called for. The designs as drawn up by the artist are duplicated on the vessel with a carpenter's or lumberman's pencil and the different colors applied in their designated spaces. This work can be carried out by any painter. Care, however, should be exercised in the selection of pigments to form the various colors because many of these, especially reds and blues, are not permanent.

Great care is usually taken in applying the interior finish to staterooms, deckhouses and officers' quarters. The general scheme followed is governed by the trade the vessel is to engage in. Thus vessels designed for tropical runs should be finished in white or light colors while those for navigation in cold regions generally are finished in darker effects. Staterooms are often finished in white enamel and mahogany when a pleasing effect at minimum cost is desired. This finish is easily kept clean and is quite durable. The enamel paint used is nothing more than a good grade of white paint to which varnish has been added. It dries with a hard, glossy coat that is readily cleaned without injury by an application of soap and water.

In preparing interior woodwork for painting, several preliminary operations are necessary if the best results are desired. In considering soft woods, the first step is to cover all knots with two coats of shellac. If this is neglected, pitch from the knots works through the paint in time resulting in an unsightly appearance. Next, the wood should be given a priming coat of paint. This coat should contain a large percentage of oil as the wood readily absorbs this ingredient. If ordinary paint is used for a primer, much of the oil is drawn out, letting the pigment and base rub off readily. This should be avoided.

Digitized by Google

A good priming coat is made of white lead, oil, drier and turpentine. In the second coat the drier may be omitted if desired. The third coat is the base for the tint desired and if this is to be any other than white, the coat should be tinted somewhat like the finishing coat that is to follow. Flat coats that are to be varnished are made of white lead and turpentine without oil. This dries "dead," without luster.

For finishing wood naturally, two coats of white shellac followed by two coats of varnish will give good results. The wood should be clean and thoroughly sandpapered with the grain. If sandpapered against the grain, scratches are sure to show up after the varnish is applied. After sandpapering, a good wood filler should be rubbed in if the wood is of an open grain, oak for instance. With some woods, such as cherry, filler is not required. The first coat of shellac raises the fiber of the wood and sets it in this position. Thus it should be sandpapered before the next coat is applied. The second coat of shellac should also be sandpapered before applying the varnish. As a general thing, varnish is not sandpapered.

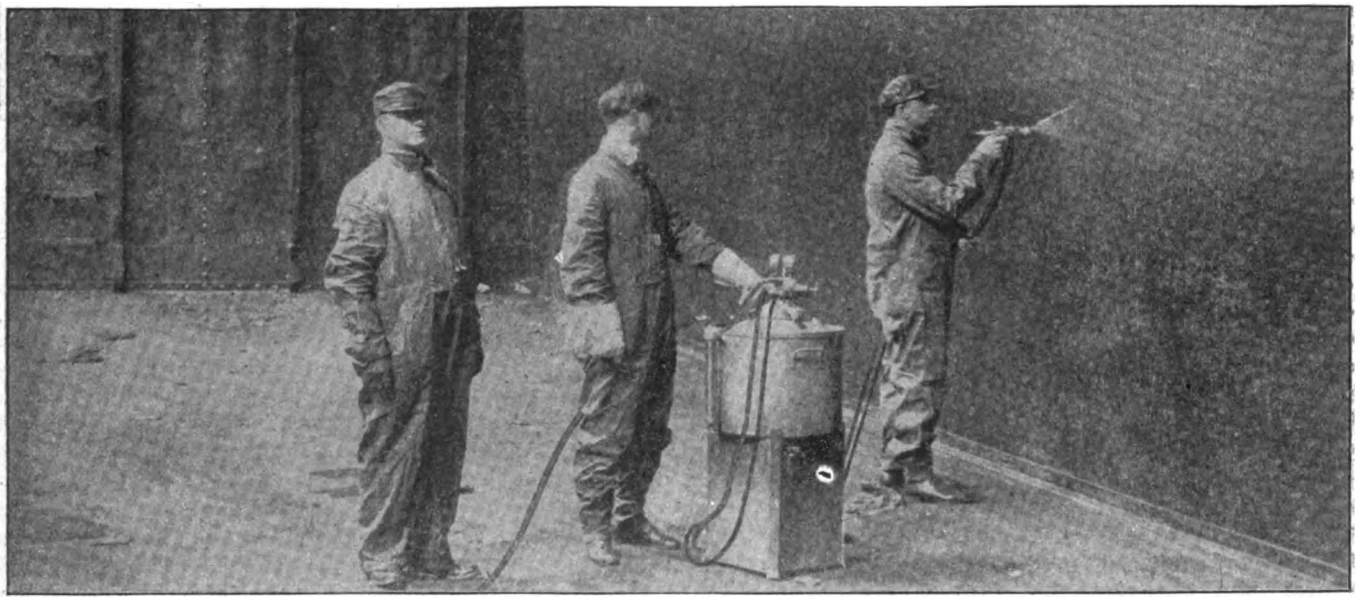
In painting the hulls of wooden ships, the procedure is somewhat different than that followed on steel vessels. As wood absorbs the oil from the paint, the priming coat should contain plenty of this ingredient. There is one exception to this rule, however, that of painting woods containing a high percentage of pitch such as yellow pine. In this case turpentine is liberally added to the priming coat. This acts as a solvent to the pitch and makes the absorption more uniform. White lead is the base generally used for priming the hulls of wooden ships although it is known that red lead paint is equally effective. For a number of years this practice has been followed by English shipbuilders. To some extent it is carried out in Canada and is being gradually introduced into this country. It is sometimes claimed that red lead is less likely to soften and blister over pitchy spots than is white lead. If the vessel is to be finished in white, red lead makes a poor priming coat for the upper works as it will show through at least two coats of white subsequently applied.

From the most remote times and until the last few years paint has been applied to vessels in two ways—by brush and with rags, both of which are manual operations. Experiments with mechanical means of painting have been carried out for a number of years with the result that the pneumatic painting device, paint sprayer or paint gun, as it is called in the shipyard, is gradually superseding the brush. During the war, when labor was at a premium and time precious, the shipbuilder eagerly welcomed the paint gun as it furnished the means of eliminating much costly hand labor and speeding deliveries. Its successful use in the automobile field promoted its introduction into the shipyards. Briefly described, a paint gun is a simple device consisting of a strong receptacle partly filled with paint which is under air pressure. The pressure of the air forces the paint through a tube to a nozzle controlled by the painter. Painting with brushes is slow, hard work while with the paint gun it is a comparatively easy operation. In fact it can be likened to watering the lawn as the workman simply has to direct the paint where he wants it.

The paint gun can be used in confined situations where it is difficult to reach with the brush. This is particularly true of certain portions of a vessel's interior. It spreads its coat evenly and uniformly which results are not always attained by hand brushing, especially if the workman takes little pride in his work.

The use of the paint gun does not call for an added amount of material or different preparation of the paint. As far as practical results are concerned, a recent investigation of this process reveals the fact that the paint gun saves an enormous amount of time as one man can do the work of from five to seven men working with brushes. If due care is exercised, the paint can be laid perfectly even, resulting in a uniformly finished surface. No more preparation of the surface is required for painting with the spraying process than is necessary in hand brush operations.

In working with the paint gun, the operator directs the paint with the spray nozzle with a uniformly even motion. Some practice is required to lay the paint evenly, just as skill is required to paint with a brush. Once the operator has mastered the principle, however, which takes but a few hours at the most, he generally forms the opinion that the paint gun is his friend as it saves an enormous amount of hard work.



PAINTING THE INTERIOR OF A VESSEL'S HULL WITH THE PAINT SPRAYING MACHINE—THIS OPERATION REDUCES LABOR COSTS

Digitized by Google

Practical Ideas for the Engineer

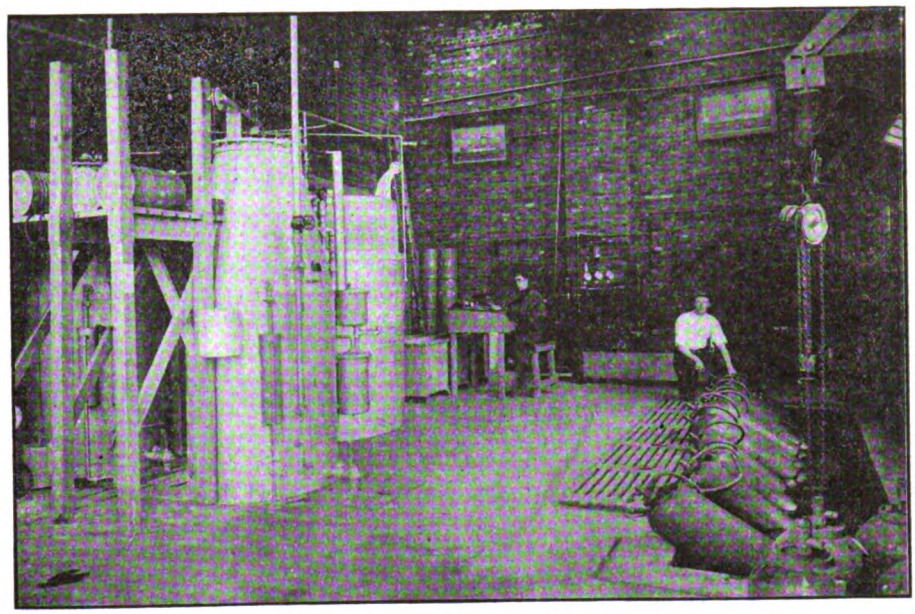
Welding Equipment—Marine Turbine Governor—Oil Fuel Sprayer —Setting Slide Valves—Pitted Tail Shafts—Late Marine Patents

UNUSUAL demands made upon repair plants have brought about some important changes in their arrangement. Welding has taken an important place and today several yards are installing complete welding equipment. The Morse Dry Dock & Repair Co., Brooklyn, N. Y., has installed gas-producing equipment for its welding work. During 1918, the Morse yard was purchasing acetylene from an outside concern but the rush of work prompted the management to take steps to guarantee its supply.

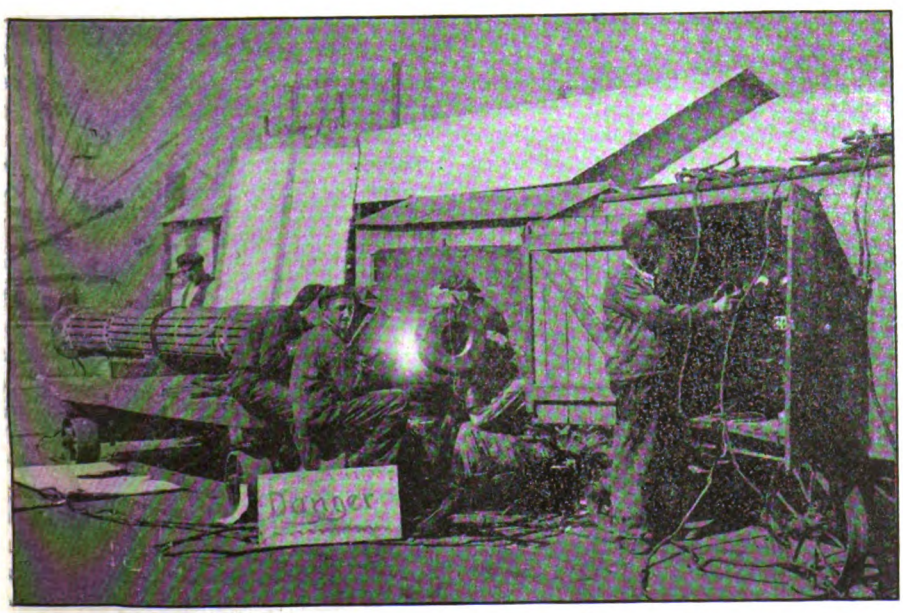
The Morse gas plant was built by the Davis-Bournonville Co., manufacturer and distributor of oxy-acetylene equipment. The generating and compressing plant produces 13,000 cubic feet of gas each week and this is forced under high pressure into the cylinders which are used by the acetylene welding department.

There are two generators, each having a carbide capacity of 300 pounds at a single charge. From the purifier and drier chambers and to the high-powered triple-action compressor, the gas is forced through the charging line until 12 cylinders are charged up to 250 pounds each. An extensive water cooling system is utilized through the compressor jackets and on the charging line.

In addition to overcoming any possible curtailment of its acetylene gas supply, the Morse yard has also taken precautions to safeguard against any possible explosions. To this end, the roof of the building is fitted with a grade and two ventilators especially adapted for ridding the upper part of the room of any gases which may have collected there. The motor switches are of special design to prevent sparking and the carbide is stored in a brick-tight chamber nearby. These precautions are important because acetylene gas, when mixed with the correct proportion of air, is capable of causing a tremendous explosion. Carbide must be kept away from moisture, otherwise gas will be generated.



PLANT FOR GENERATING ACETYLENE GAS AT THE MORSE DRY DOCK & REPAIR CO., BROOKLYN, N. Y.



WELDING THE TAIL SHAFT OF THE ARIZONIAN, A FORMER TROOPSHIP NOW BEING CONVERTED INTO A CARGO CARRIER

Marine Turbine Governors

A constant power load is obtained on the propelling unit of a ship at sea in fair weather as the weight and resistance of the ship cannot be changed nor can the dimensions of the propeller be altered. The load carried by the engines remains uniform. Thus, a governing device to prevent the machinery from overspeeding is practically unnecessary.

In bad weather, of course, a different situation prevails. With the ship pitching, the propeller is often thrown partially or wholly out of the water, thus relieving the entire load from the engines and allowing them to accelerate rapidly and perhaps reach dangerous speeds. In the case of a reciprocating engine with all its moving parts, the first symptoms of racing are immediately apparent, and it is the usual practice to station an engineer at the throttle to keep the speed within safe limits.

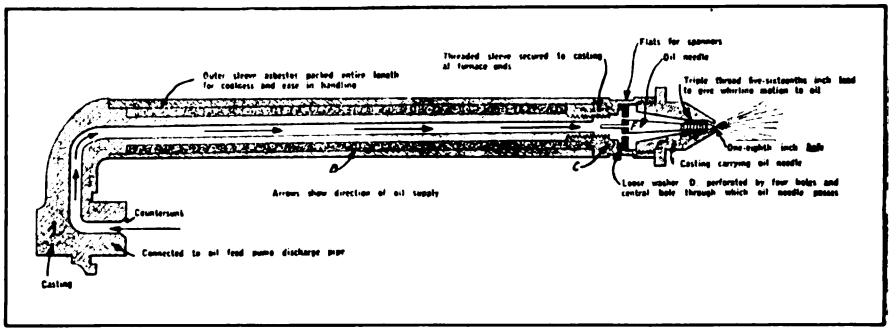
In the case of a turbine. the first indications of racing are not so apparent to the watch engineer because there are practically no moving parts in sight. But the danger of wrecking a turbine through overspeeding is just as great as with the reciprocating

Digitized by Google

engine run under similar conditions. The Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has developed a governor which is designed to regulate the flow of steam to the nozzles in such a manner that the speed is kept practically constant under all conditions. The arrangement consists of a vertical spindle mounted on the forward end of the turbine, driven by a worm wheel from the main shaft at a speed of about one-quarter of that of the main shaft. At the top of this spindle is mounted a fly ball governor of the familiar type, the motion of which is transmitted through a system of levers to a small steam relay piston valve, which in turn regulates the flow of steam to the operating cylinder of the main governor valve.

As the speed of the turbine increases above normal, the governor weights are thrown farther away from their center of rotation by centrifugal force and the steam relay valve is moved a corresponding amount. This opens up the steam ports which exhaust the steam from the bottom of the governor valve operating cylinder producing an unbalanced condition and the governor valve starts to close, slowing down the turbine. But as soon as the speed is reduced to normal the governor weights return to their former position, moving back the relay and reopening the governor valve.

While no attempt is made to obtain extremely close regulation, such as is needed on electric generator drives, it is stated that the marine governors are positive in their action and hold the speed of the turbine within resaonable limits.



SECTION OF OIL FUEL SPRAYER USED ON GERMAN TORPEDO BOAT DESTROYERS

Oil Fuel Sprayer

The device shown in the accompanying illustration is an oil fuel sprayer of the type fitted in German torpedo boat destroyers. According to the *Transactions* of the Institute of Marine Engineers, London, the fitting is simple and admits of no adjustment of the spray orifice after it is connected up for use. This, it is pointed out, is contrary to British practice.

The apparatus consists of a solid iron casting, *A*, connected to the oil fuel pump discharge pipe at one end, the other end terminating in a long tube with a fine thread at one end. Over this end a tube, *B*, is fitted, the space between being packed with asbestos. This tube is secured by means of the threaded portion, *C*. A loose washer, *D*, fits into a recess in *C*. This washer carries the spindle of the oil needle, and, in addition, is perforated by four equidistant holes. The end portion, *E*, screws into *C*. The orifice through which the oil is pumped into the furnace is ⅛ inch diameter. When *E* is screwed home there is little play for the needle, *F*. The outer collar of the needle rests against the loose washer, *D*. The parallel portion of the needle is provided with a triple thread, ⅝-inch pitch, which gives the necessary whirling motion to the oil and assures the breaking up of the particles for efficient combustion.

The air cones used are unlike those employed in British practice, in which the air slots are cut round the circumference of the cones. In the German practice two cones are fitted, one inside the other, and each have slots cut, and the air can be adjusted by rotation of the outer cone.

Valve Setting Involves Many Factors

SETTING slide valves, according to Harry Stone, in *The Bulletin* of the Lake Carriers' association, next to keeping sufficient water in the boilers is the most important feature of steam engineering. As Mr. Stone writes from long practical experience, his conclusions are both logical and interesting. He says:

"It is quite certain that the stephenson link has come to stay and, unfortunately, with this link worked by eccentrics on the shaft, it is impossible to set the slide so as to secure equal distribution of steam to both strokes of an engine without seriously interfering with the other events of the valve. S. H. Hunter suggests setting the valve "blind" on the top center with fairly good opening for lead on the bottom center, in order to secure equal cut off for both strokes, up and down. I never had a valve set in that manner, and Mr. Hunter does not say that he ever had. That method would result in the desired equal cut off for the two strokes of the engine and, theoretically, it looks half good. But is it half good? We have eliminated the evil of lead at the top center, but have we not doubled it at the bottom center? Let us see. When the crank of an engine with a 42-inch stroke, with a connecting rod twice the length of the stroke, has reached mid position on the down stroke, the piston is 2.62 inches below mid position in the cylinder, and on the up stroke when the crank has reached mid position, the piston is 2.62 inches below its mid position, and raising the valve enough to cut off at equal distances from the centers on both strokes, would give the valve so much lead on the bottom that the resistance of the lead steam to the piston on the down stroke would equal the resistance it would meet on both strokes with half the lead.

"Again, if the steam does follow the piston at full pressure two or three inches below mid position down stroke, it is not a deterrent to the movement of the engine as is lead steam, but an increment to its motion and momentum which, if not destroyed by lead or compression in passing the center will be expended in useful work on the up stroke, thus partly compensating for the shorter cut off on that stroke. Mechanical science deals much with equality and the mechanic naturally appreciates the equation between magnitudes and quantities, and the engineer is apt to be more disturbed by his mechanical sense of the inequality of his cut off than by the actual performance of his engine on account of it.

"Lead is no more objectionable or desirable because the engine is working in single, double or triple harness, except that the back pressure in the high pressure and intermediate cylinders is an increment to the compression which renders lead still more unnecessary. High speed of an engine does not demand lead because compression is on

Digitized by Google

the job before lead, and if it is properly adjusted, it will do all that is claimed for lead and do it better. But abused compression is worse than lead because with a piston valve, or a D slide that cannot be blown off the cylinder face, the compression can be, and some times is, carried to a point exceeding boiler pressure. Compression cannot be as easily managed as lead because we must have an indicator diagram to give us the necessary data for adjustment, but properly adjusted, there is no excuse for lead whatever. An indicator diagram for both strokes on one card, one over the other, will make it clear that compression is of more importance than lead. We can, by altering the exhaust edges of the valve, have any compression we please, or no compression, with any lead or no lead.

"The double diagram shows two points in the revolution of the crank, near the centers, at the intersection of the compression curve and expansion line, where the compression on the exhaust side of the piston exactly equals the steam pressure on the steam side. These points are traced at the moment when the piston is nearing the end of its stroke, and their distances from the ends of the stroke vary with the compression, steam pressure and length of cut off, and at these more interesting and important points, the much talked of "meeting the return" is practically accomplished, and the piston smoothly advances a short distance to the end of its stroke against a gradually increasing compression, just enough to overcome its momentum without checking the speed of the engine and without the explosion of the steam bomb (lead) ahead of the piston at a point and time when it is an undesirable quantity.

"Referring again to Mr. Hunter's suggestion, it can be carried out without lead at either center by raising the valve for part of the required distance, and shifting the eccentric back on the shaft for the rest, thus securing equal cut off for both strokes, but at the same time a distortion of the other events of the valve. Whether there would be anything gained, could be positively known only by actual trials with the same engine. I teach lead because it is in the engineering course, but advise my students against it and to try both methods, lead and no lead, when they have an opportunity, and convince themselves of the merits of either method."

Pitting of Tail Shafts

A remarkable instance of pitting of steel shafting after only seven months' service was disclosed recently, according to the *Proceedings* of the United States naval institute, upon the docking of the U. S. S. NEW ORLEANS at the Charlestown navy yard, Boston. The NEW ORLEANS is one of the older types of protected cruisers of about 3400 tons and is sheathed with copper. About the middle of July, 1917, the installation of new propeller shafts was completed at the navy yard on Puget sound but the urgent war requirements did not permit encasing the steel shafting with the usual composition sleeve. The tail shafting, a hollow steel forging 13¾ inches at its greatest diameter, has a section 30 feet 8 inches long between the end of the stern tube and the forward edge of the strut bearing which, except for the protective coats of paint, was directly exposed to the water.

Upon examination in the dock on Feb. 16, 1918, the surfaces of both shafts were found to be covered with innumerable, deep, irregular pits in areas of from 10 to 16 square inches and from ⅛ to ¾ inches deep. This is shown in the accompanying illustration. A black, oxidized, metallic substance in the deepest pits was removed with scrapers. This had the consistency and appearance of soft putty, mixed with lampblack. A chemical analysis of this material gave the following result:

Ferrous oxide, per cent, 35.3
Ferric oxide, per cent, 30.5
Loss on ignition, per cent. 16.
Undetermined, per cent, 18.2

Ferric oxide is probably FeO to Fe_2O_3 after exposure to air. FeO is probably hydrated ferrous oxide.

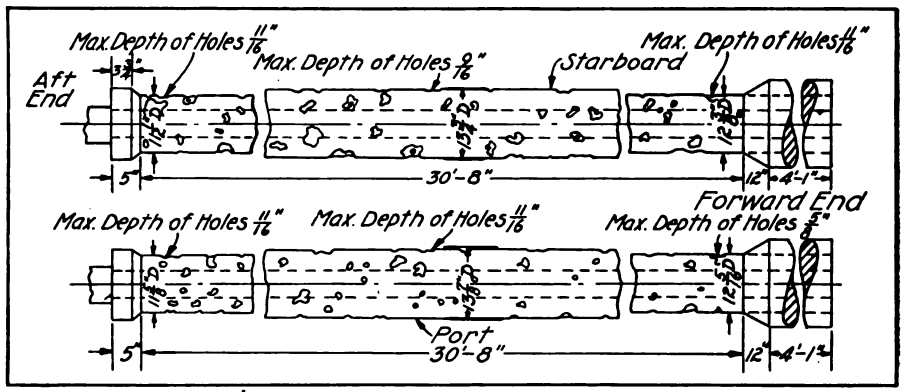
After consultation by telephone with the bureau of steam engineering, the following treatment was undertaken:

1.—Shafting wire-brushed and sand-blasted down to bare metal.
2.—Filled all deep pitholes with filler.
3.—Wrapped with layer of waterproof tape—turns applied opposite to ahead rotation of shaft.
4.—Coated with shellac.
5.—Wrapped with layer of adhesive friction tape.
6.—Coated with shellac.
7.—Painted with one coat of anticorrosive paint.
8.—Painted with one coat of antifouling paint.

As a performance of war emergency, the whole operation of cleaning and preservation was accomplished in 5 hours of continuous work.

Upon re-examination of the propeller shafting in drydock on June 28, 1918, it was found that the corrosion and pitting had not progressed over the condition existing in February. As a further protective measure, the following additional operations were carried out:

After the coat of anticorrosive paint, the shafts were parcelled with canvas sheeting soaked in tallow. They were then served with housline, taking half hitches every 4 or 5 inches so as to prevent unraveling in case the housline was cut at any point; finally a coat of molten pitch and tallow, two parts pitch and one part tallow, was applied to complete the protective jacket.



STARBOARD AND PORT TAIL SHAFTS OF CRUISER NEW ORLEANS PITTED BY THE ACTION OF SEA WATER

Late Marine Patents

Copies of any of the following patents can be obtained by sending 15 cents in stamps to Siggers & Siggers, 918 F street N. W., Washington, by mentioning THE MARINE REVIEW.

1312369—Hull of water craft, Francis J. Thuman, Baltimore.

1312391—Torpedo boat, Giovanni Emanuele Elia, New York.

1312473—Ship salvaging method and apparatus, Henry D. Deam, Benton Harbor, Mich.

1312496—Canvas securing fastening clamp for hatches of vessels, Edward G. Anderson and Archie H. Graham, Portland, Oreg.

1319462—Ship construction, Alvin A. Daugherty, New York, assignor, by mesne assignments, to the National Oil Co., New York.

1319480—Ship construction, Gustaf Magnuson, Denver, Colo.

1319492—Means for attaching ships' boats to and detaching them from tackle suspended from davits or the like, Augustus W. L. Schermuly, Sutton, Eng.

1319591—Vessel, Harry M. Koenig, Milwaukee.

1319592—Vessel, Harry M. Koenig, Milwaukee.

1319610—Means for securing tarpaulins and similar coverings upon ships' hatches, Oscar Norling, Gothenburg, Sweden.

1319613—Manually propelled boat, Yust Peterson, Helena, Mont.

1319675—Engaging and disengaging gear for ships' boats, Harry W. Broady, Bayside, N. Y., assignor to American Balsa Co., Inc., New York.

Digitized by Google

Bits From the Log of Progress

Events of Interest to Those Engaged in Operating, Constructing and Outfitting Yards and Ships

SOUTH AMERICAN trade conditions are improving, according to J. L. Holmes, South American representative of the Winchester Repeating Arms Co., New Haven, Conn. American exporters are gradually getting a foothold in some of the principal manufacturing cities of the southern countries. One of the chief difficulties which American jobbers have had to contend with is that of packing goods for southern shipment. A large number of boxes have been broken in transit and the contents spoiled or lost. This factor is the cause of complication between consignor and consignee.

* * *

THE 3-MAST schooner S. N. CASTLE, 58 days out of Samoa with a cargo of copra, recently arrived at Honolulu using her cargo as fuel for the donkey boiler which was furnishing power to operate the pumps against a leakage of 12 feet per day. Officers stated that had the schooner run into heavy weather, it would have been impossible to keep her from foundering. Ten months ago, the CASTLE left San Francisco for Sydney, Australia. From Sydney to Apia she made a record run of 3900 miles in 17 days. As this amounts to practically 230 miles a day for 17 consecutive days, it is excellent sailing. It averages better than nine knots an hour for 408 hours.

* * *

THE AGAWAM, a 3600-ton, gross freighter built by the Submarine Boat Corp., recently made an excellent towing performance. This vessel which is driven by Westinghouse geared turbines, left Port Eads for Hull on Oct. 13. When in midocean, she received a wireless call for help from the Norwegian steamship SEYPEN, stating that she had a broken tail shaft and was in grave danger as she was wallowing in the trough of a heavy sea. A gale was blowing at the time. Twenty-four hours later, the AGAWAM had a line aboard the distressed craft and was towing her at a speed of 6 knots, an excellent speed for towing in a heavy sea. The crippled craft was successfully brought to port at St. Micheals, Azores islands, on Oct. 31.

* * *

SUCCESSFUL EXPERIMENTS with a new hydraulic tractor for towing canal boats have been conducted at Liege. The new apparatus, according to Trade Commissioner C. E. Herring, insures rapid towing and is less expensive than towing by steam, horse or man power. Boats of 350 to 400 tons which now require 10 to 12 days to traverse the 95 miles from Liege to Antwerp arrive at their destination in five or six days under the new system. It is also claimed that the hydraulic tractor has the advantage of not injuring the tow line in getting under way, while a saving in locking time is also shown.

* * *

THE SUSQUEHANNA, owned by the United States shipping board, formerly the North German Lloyd liner RHEIN, has been towed to the Morse dry dock at Brooklyn, N. Y., to be fitted for carrying first class passengers between New York and Mediterranean sea ports. She will be operated by Phelps Bros., New York, formerly agents for the Austro-American line to Trieste.

* * *

LOYAL EMPLOYES of the Baltimore Dry Docks & Shipbuilding Co. took action to get rid of all "reds" from their ranks recently. The action was started through the finding of a seditious circular advocating the seizure of the plant. At noon hour, the plant superintendent called the men together and laid the situation before them. The men pledged themselves to rid the plant of disturbers without outside assistance and they made good their word. The circular which was headed "Your Shop" was issued by the communist party of America, Chicago.

* * *

THE MARY POWELL, a Hudson river steamer, has been sold for $40,000 to the Hudson Valley Waste & Metal Co., Poughkeepsie, N. Y. According to the terms of the sale, the craft must be scrapped. The MARY POWELL holds a record of 26½ miles an hour and has been berthed at the Sunflower dock since the death of Capt. Arthur Warrington, last fall. The vessel saw 55 years of river service. She was put in commission in the summer of 1863 under Capt. Absalom Anderson. When he retired in 1886, his son, Capt. A. Eltinge Anderson took command of the craft and remained in charge of her until his death. During her long career, the POWELL met with few mishaps. Once a pilot ran her into a dock, breaking a crankshaft and another time, during a hurricane, her smokestacks were blown away. During her life, she carried more than 7,000,000 passengers.

* * *

THE AMERICAN steamship HURON, formerly the German liner FRIEDRICH DER GROSSE, recently came to the Morse drydock, Brooklyn, N. Y., to be fitted into one of the finest passenger vessels in the service of the shipping board. The contract involves the expenditure of a large sum of money and some authorities in shipping circles state that it is the largest ship repair job ever undertaken in this country. Coal-fired boilers are to be replaced with boilers equipped for oil fuel. Twenty-four furnace fronts will be provided with burners to operate under natural draft. Three oil heaters will be installed but one is a spare as two can take care of the plant under all conditions. The ship will be provided with a gyrostabilizer, the foundation of which will take a thrust of 470,000 pounds.

* * *

THE MUNSON STEAMSHIP line has acquired a site for a 25-story office building that will be erected on the property known as 71-73 Wall street, New York, which was purchased from the American Cotton & Grain exchange, and the property at 67-69 Wall street purchased from the United States Realty & Improvement Co. The combined site has an area of 12,500 square feet and the cost of the land and the improvement will be close to $4,000,000. The improvement will give the Munson interests the third largest frontage on Wall street. The George A. Fuller Co. has contracted with the Munson company to have the building ready for occupancy by the early part of 1921. The floors of the new building will contain about 10,000 square feet of rentable space. The building will be thoroughly modern and will be equipped with high-speed elevators.

* * *

THE SHIPPING BOARD has issued an order to suspend work on the concrete vessel now under construction at Oakland, Cal. This is taken by shipping men as meaning that concrete ships as cargo carriers are not finding favor with shipping experts.

Digitized by Google

Bits From the Log of Progress

Events of Interest to Those Engaged in Operating, Constructing and Outfitting Yards and Ships

BETWEEN the United States shipping board and the owners of vessels requisitioned during the war, there looms a bitter contest over the settlement to be made for damages entailed as a result of the government's use of these ships. It is declared that not only will the shipping board refuse to allow any claims for "consequential damages" in excess of the regular rate of $4.15 per deadweight ton per month for cargo vessels and $5.75 per gross ton per month for passenger vessels, but in cases where boat owners refused to sign contracts, settlement at these rates will be withdrawn. It is intimated, according to the *Journal of Commerce*, that the books of some companies will be demanded to show actual costs of ships with depreciation on charges as shown by the company records. A statement of the new policy of the board, copies of which Chairman Payne has directed shall be given to owners of requisitioned ships on which settlements have not been made, contains the assertion that under the prescribed rate ship owners were permitted to make an annual net profit of 75½ per cent on their investment.

* * *

CHAIRMAN GREENE of the house merchant marine committee has introduced a bill in the house of representatives (H. R. 10534) to permit transportation of passengers on cargo vessels. The bill permits cargo vessels to carry passengers not exceeding 12 from any port in the United States to any foreign port not reasonably accessible by passenger service. The cargo vessels are to be exempt from laws and regulations applying to passenger vessels except as to laws and regulations pertaining to life saving equipment.

* * *

OVER $7,000,000 will be expended in alterations to the seven former German passenger liners aggregating 67,639 tons, recently allocated by the shipping board for a fast passenger and mail service between the United States and South America, according to a recent announcement of Frank C. Munson, president of the Munson line which will operate the ships. The regular service which will be inaugurated as soon as the ships are refitted, will consist of sailings every two weeks from New York to Buenos Aires. Ports of call will be at Rio Janeiro, Santos and Montevideo. The combined passenger carrying capacity of the fleet will be more than 3000 persons.

* * *

SUSPENDED CONTRACTS for three 10,000 deadweight ton tankers placed by the Emergency Fleet corporation with the Moore Shipbuilding Co., Oakland, Cal., have been reinstated and construction will be commenced immediately. The decision of the government to reinstate these contracts is said to have been the result of a recommendation of Capt. Paul Foley, tank chartering executive, who advised that 103,000 deadweight tons of the suspended program be reinstated as otherwise there would not be sufficient tonnage to take care of the oil requirements of the shipping board and the navy in 1920. According to Mr. Foley's estimate, the government vessels will consume 66,000,000 barrels of oil during the year which is the equivalent of 16,500,000 tons of coal.

* * *

IT REQUIRED 189 shells to sink the concrete steamer MILTON, from Philadelphia with a cargo of coal, which caught fire while lying in the River Tagus, Lisbon, Portugal. The entire vessel was ablaze in less than half an hour from the time the fire broke out and it was feared that the anchor cables might snap and that the burning vessel would drift into shipping. A Portuguese gunboat was called into action and fired 189 shells before the collier sank.

* * *

AFTER HAVING lain idle in the harbor of Vancouver, B. C., since the closing of the sealing industry in 1911, the sealing schooner LADY MINE, famous all along the Pacific coast, has been sold by A. J. Bechtel to Capt. W. H. Smith. The schooner is being refitted and will be used in the coastwise trade. Later, Captain Smith may go to the islands in the south Pacific to trade. The LADY MINE was built at San Francisco for a pilot boat but later was sold to Mr. Bechtel. This vessel is the schooner "GHOST" of Jack London's story *The Sea Wolf*.

* * *

THE LARGEST ship sale ever proposed has been arranged by the government to dispose of its wooden ship hulls now remaining in shipyards. Under its terms will be offered at eight widely separated yards on both seaboards of the country nearly 200 new wooden ships. The government has set a price of $75,000 for the Ferris-type 3500-ton hull of which there are more than of any other type. The remaining types of vessels are to be sold at prices agreeing proportionately. The details of the newly adopted plan were made public in a statement from G. H. S. Rollanson, manager of the supply and sales division of the Emergency Fleet corporation.

* * *

RECOMMENDATIONS for the private control and operation of American ships as opposed to any suggested nationalization of shipping facilities together with suggestions for revisions of existing navigation treaties are contained in a brief prepared for the Marine league by Carman F. Randolph. As expressed in the brief, the purpose of the Marine league is to promote full recognition of the paramount need of providing worldwide export outlets for the products of American manufacturers. After setting forth facts in support of the observation that the United States of all nations is most favorably placed for foreign trade and less driven to desperate remedies for her economic ills, the brief goes on to state that the return of peace is revealing so many changes in trade currents and so many altered national relationships that a broad revision of trade treaties is necessary.

* * *

AT THE RECENT monthly meeting of the chamber of commerce of New Jersey, the chamber went on record as favoring the construction of a sea-level canal across the state as a great benefit to New York through the linking together of inland waterways with the resultant economies. In opposing the adoption of the resolution, Judge MacLean asserted that the construction of such a canal would mean the loss of a large amount of revenue to New York as there would be a large number of ships to pass directly through the port of New York which depends on transshipment of merchandise and other freights at this terminal point for a large amount of revenue.

Digitized by Google

How Floating Frame Gears Work

Pinion Automatically Adjusts Itself to Keep the Tooth Pressure Constant — This Arrangement is Designed to Insure Smooth Running Under all Conditions

BY WILLIAM H. EASTON

THE floating-frame speed reduction gear, employed in connection with Westinghouse marine turbines, is now in use on over 50 ships in active service and is being installed on many more. Many marine men are becoming directly or indirectly interested in its operation, and since its operating principles are novel, a brief discussion of these principles will be of interest.

This gear is the result of an extended series of investigations conducted by Rear Admiral George Melville and John H. Macalpine, who were endeavoring, at the request of George Westinghouse, to find some economical and reliable method of driving slow-speed ship propellers by means of high-speed turbines. During their investigations, all forms of speed-reducing mechanisms were considered, but it was decided that gears were the most satisfactory.

But the problem of designing a gear that would safely transmit high powers under the severe conditions of marine service proved anything but an easy one. Theoretically it was simple enough. One had only to calculate the stresses involved, make the teeth strong enough to withstand the pressure on them, and keep the pressure on each square inch of tooth surface uniform. In practice, however, a serious difficulty was encountered which is best explained by reference to Fig. 2.

The upper view of Fig. 2 represents a double-helical pinion of the usual type which is transmitting power, with the pressure, as shown by the dots, uniformly distributed over the surfaces of the teeth in contact. This is the ideal operating condition. But let a slight misalignment in the position of the pinion shaft take place and the pressure will be removed from a part of the tooth surfaces and concentrated on the remainder, as shown in the lower view. Under these circumstances, it is readily possible for the pressure per square inch to become greater than the breaking strength of the teeth—a wrecked gear is the result.

The conditions of service demand that a pinion used in marine reduction gears must be long, narrow, and as small as possible. Otherwise the size, weight, and cost of the entire gear would mount to prohibitive figures. The permissible error in the alignment of such a pinion is small, the difference of a few thousandths of an inch between the relative positions of the two end journals, *S* and *T*, Fig. 2, being often sufficient to cause disaster. As this small difference is easily caused by a variation in the wear or of the temperature of the bearings, the unequal

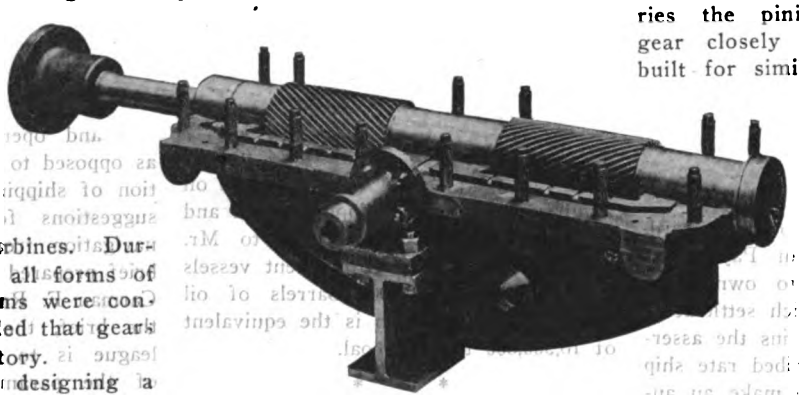


FIG. 1—LOWER HALF OF THE FLOATING FRAME WITH THE PINION IN PLACE

tightening of the holding-down bolts, the warping of the gear housing, or other changes that are apt to occur, especially with machinery on so unstable a foundation as a ship's hull, it is evident that a flexible unit must be used.

Messrs. Melville and Macalpine tried for a long time to design a gear that would be sufficiently strong and rigid to insure uniform tooth pressure but then finally came to the conclusion that the problem must be solved in a totally different way, and that the pinion, instead of being held rigidly in place, must, on the contrary, be free to adjust itself so that it automatically keeps the tooth pressure practically constant, regardless of slight changes in the alignment of various parts of the gear structure. This conception, embodied in the floating-frame gear, proved to be the true solution of the problem.

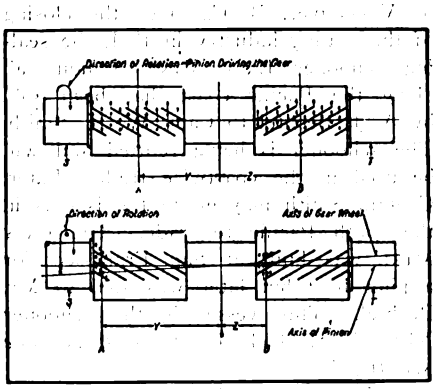


FIG. 2—ABOVE, PINION TEETH SUBJECTED TO UNIFORM PRESSURE—BELOW, TO DISTORTED PRESSURE

With the exception of its unique feature, the floating-frame that carries the pinion, the floating-frame gear closely resembles other gears built for similar service. Disregarding the oiling system and other auxiliaries, it consists essentially of four parts. The housing is cast iron or steel and forms a support and a cover for other parts. The gear is of the double-helical type. The spider is cast iron and the rim, in which the teeth are cut, is steel. It has two bearings rigidly mounted in the housing.

The floating-frame, shown in Fig. 1, is a steel casting and is heavily reinforced against vertical and horizontal stresses. It is divided horizontally into two parts between which the pinion is held. Fig. 1 shows only the lower part of the frame. The upper section is held in place by means of 14 studs.

The sole supporting unit of this frame is a steel I-beam, clearly shown in Fig. 1. This I-beam is bolted to the bottom of the housing and the frame does not touch the housing at any other point. It is evident that, owing to the flexibility of the web of the I-beam, the frame can rock slightly in the vertical plane, and this motion forms the special feature of the floating-frame construction. Any tendency to move in a horizontal plane, through a twisting of the web of the I-beam, is prevented by means of adjustable struts, shown in Fig. 4, between the floating-frame and the housing.

The pinion, Fig. 1, is forged from low carbon steel and has three bearings, all of which are carried by the floating-frame. The interior is hol-

Digitized by Google

low and the driving shaft, which is flexible, extends all the way through and is secured at the far end. The other end is fastened to the turbine shaft by a flexible coupling. The flexible shaft permits the pinion to tilt with the floating frame, and the flexible coupling permits it to slide endwise in its bearings.

Operation of the Gear

When all parts of a gear are in perfect alignment and the axes of the gear wheel and the pinion are in the same plane, the total tooth pressure will be uniformly divided along the faces of the teeth in contact, as shown in Fig. 2, and satisfactory operation will be obtained regardless of whether the pinion is rigidly held or is carried in a floating-frame. But as soon as some of the innumerable possible causes disturb the alignment and force the axes of the gear wheel and pinion into different planes, then the pressure distribution becomes distorted as shown in Fig. 2.

As has already been pointed out, this condition, unless the misalignment is exceedingly small, is highly detrimental and if not promptly eliminated will result in the scoring or the breaking of the teeth. With a pinion held in rigid bearings, the misalignment will persist until altered by a further accident or by human adjustment, but a floating-frame pinion will correct it immediately in the following manner.

In Fig. 2, upper view, the vertical lines *A* and *B* are drawn through the centers of pressure for each helix of the pinion, and the horizontal lines, *Y* and *Z*, represent the distance between these centers of pressure and the central point of the pinion. It is evident from inspection that under conditions of uniform pressure the moment *A-Y* equals the moment *B-Z* and that the end-bearing reactions, *S* and *T*, are equal. There is, therefore, no tendency for the pinion to tilt around its central point. When misalignment occurs, however, the centers of pressure for each helix shift and, as shown in Fig. 2, lower view, the moment *A-Y* becomes considerably greater than the moment *B-Z* and consequently the bearing reaction *S* is greater than *T*. The pinion, therefore, tends to turn around its center, and since the floating-frame permits it to do so, it tilts automatically and instantly until the moments are again equal and uniform pressure conditions are restored.

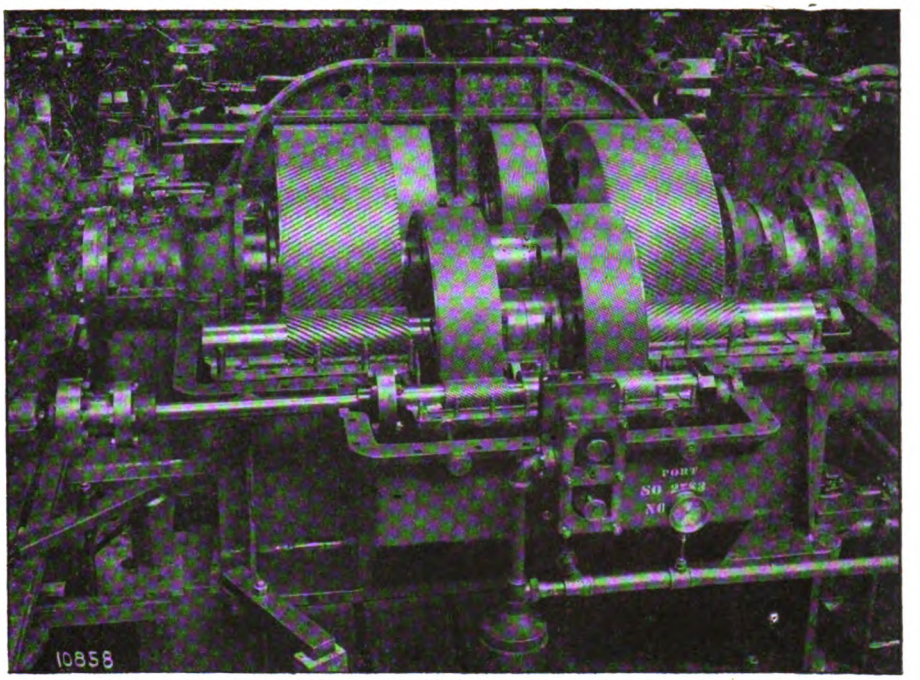


FIG. 4—DOUBLE REDUCTION FLOATING FRAME GEAR WITH TWO SETS OF PINIONS READY FOR TESTING

Corrects Errors Satisfactorily

The extent to which the floating frame can thus correct errors of alignment is shown by the following example. A certain 6000-horsepower gear with a floating-frame pinion was carefully tested and it was found that the pinion shaft could be moved over 1/5-inch out of line—an amount that would never be remotely approached in practice—without causing trouble; while if the pinion bearings had been rigid, the maximum permissible error of alignment would be 0.007 inches.

In addition to correcting errors of alignment, the floating-frame pinion will also insure uniform tooth pressure in spite of such unavoidable conditions as the tendency of the pinion to twist under load, the unequal wear or heating of the bearings, etc. Equal distribution of the load between the two halves of the gear and the pinion is insured by giving the pinion freedom of motion endwise in its bearings, for if one-half tends to carry a larger part of the load than the other the helical teeth inclined at an angle will cause the pinion to shift until equality is established.

One of the things for which the floating frame will not compensate, is inaccurate tooth cutting. The teeth must be cut with high precision in order to insure quiet operation.

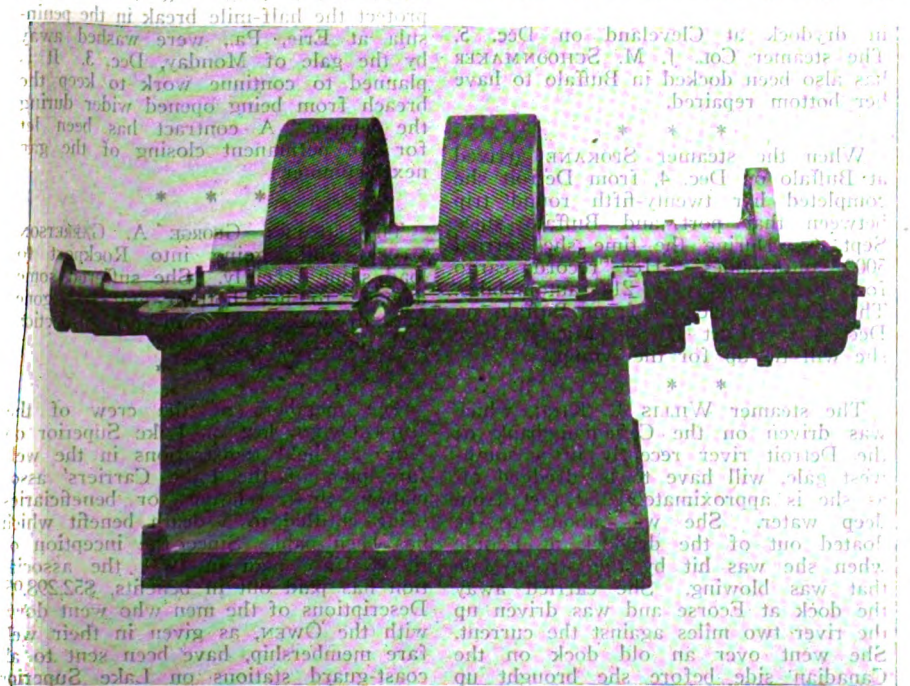


FIG. 3—SINGLE REDUCTION FLOATING FRAME GEAR WITH THE UPPER HALF OF HOUSING AND FLOATING FRAME REMOVED

Digitized by Google

Activities in the Marine Field

Latest News From Ships and Shipyards

Past Season Leanest for Many Years

CLOSE of navigation on the Great Lakes for 1919 brings to an end one of the most disappointing years experienced by lake vessel operators for many seasons. Almost at the close of navigation this season, two vessels, the MYRON and the JOHN OWEN sank in Lake Superior with a heavy loss of life. The loss of these vessels is fully described on page 23 of this issue. Strikes and generally uncertain conditions throughout the season, are the chief causes of the light freight movement of the past season. Not since November, 1914, has the volume of traffic handled at the St. Mary's river waterways been as light as it was last November. The last steamer to leave the lower lakes, upbound, was the GLENYON which left for Fort William on Dec. 5 with a general cargo.

* * *

Business interests in the Pittsburgh district and those in eastern Ohio have renewed efforts to secure government approval of the proposed Lake Erie-Ohio river barge canal for the route from Ashtabula, O., to Pittsburgh. They oppose Cincinnati and Toledo interests which are working to have the route established from Toledo to Cincinnati. Eventually, one of these routes is predicted as a certainty with a greater development of inland waterways and a trade expansion made possible with the linking by an all-water route of the coal of Pennsylvania and West Virginia and the iron ore brought down the lakes.

* * *

Improvements by the state of New York of the barge canal system have led to numerous inquiries for manufacturing sites along the canal near Buffalo, according to a recent dispatch from that city. J. W. Grady, canal traffic agent of the New York state department of public works, has asked the Buffalo chamber of commerce and other chambers along the canal to prepare data to be supplied industries so as to develop commerce over the canal. The recent towing of three barges from Lake Erie over the canal from Buffalo to Albany, thence down the Hudson river to New York and from there through Long Island sound and Narragansett bay to Providence, R. I., has been an incentive to shipments over the route.

* * *

The steamer JOHN A. DONALDSON, in drydock at Ecorse, has 22 plates to come off. She was aground and had been driven across a slip at the shipyard during the gale of Nov. 29.

* * *

The Port Arthur Shipbuilding Co., Ltd., Port Arthur, Ont., delivered the steamer CANADIAN SOWER to the Canadian government on Nov. 18. This is the fourth vessel the company has turned over this year and the last to be delivered this season. The other three vessels were the CANADIAN TRADER, delivered June 18; CANADIAN SAILOR, delivered Aug. 7 and the CANADIAN ADVENTURER, delivered Oct. 29. The latter vessel is shown in the accompanying illustration. These vessels are all full canal-size ocean-going freighters of the same design, having a deadweight tonnage of 3400. Other work done by the company in 1919 consisted of building four trawlers and extensive repair work on 30 vessels. The company is now building two steel ocean freighters which will take the water next spring.

* * *

The steamer LEWISTON which struck in the Soo river recently was placed

FREIGHTER CANADIAN ADVENTURER

in drydock at Cleveland on Dec. 5. The steamer COL. J. M. SCHOONMAKER has also been docked in Buffalo to have her bottom repaired.

* * *

When the steamer SPOKANE arrived at Buffalo on Dec. 4, from Detroit she completed her twenty-fifth round trip between that port and Buffalo since Sept. 6. During the time she carried 5000 automobiles. Her record cargo for the season was 214 automobiles. The SPOKANE cleared from Buffalo on Dec. 4 for Port Huron, Mich., where she will tie up for the winter.

* * *

The steamer WILLIS L. KING, which was driven on the Canadian bank of the Detroit river recently in a southwest gale, will have to be dredged off as she is approximately 150 feet from deep water. She was about to be floated out of the drydock at Ecorse when she was hit by the strong gale that was blowing. She carried away the dock at Ecorse and was driven up the river two miles against the current. She went over an old dock on the Canadian side before she brought up against the bank. She is now in shallow water. In order to release her, it will be necessary to dredge a channel about 509 feet long and 75 feet wide. A suction dredge has begun this work.

* * *

At a meeting of the executive committee of the Lake Carriers' association held on Dec. 4, routine business only was transacted. President Livingstone read a dispatch from Detroit stating that all Canadian aids and spar buoys in Amherstburg and Ballards' reef channels were being taken in.

* * *

Edward T. Cahill, solicitor of the state of Wisconsin, acting on behalf of that state and Michigan, Ohio, Indiana, Pennsylvania and New York has filed with the chief of the army engineers, an objection to the issuance of a permit to the state of Illinois for the construction of a waterway to connect the Great Lakes with the Mississippi river. Mr. Cahill charges that the state of Illinois has abused the privilege granted in a permit of the secretary of war to the city of Chicago to take a certain amount of water from Lake Michigan and that as a result, lake levels have been materially lowered with a consequent loss of millions of dollars a year to shipping interests in the United States and Canada.

* * *

One hundred thousand cubic yards of sand which had been placed by the Great Lakes Dredge & Dock Co. to protect the half-mile break in the peninsula at Erie, Pa., were washed away by the gale of Monday, Dec. 3. It is planned to continue work to keep the breach from being opened wider during the winter. A contract has been let for the permanent closing of the gap next summer.

* * *

The steamer GEORGE A. GARRETSON struck while going into Rockport to load stone recently. She suffered some damage to her bottom and has gone into drydock at Lorain for inspection and repairs.

* * *

Ten members of the crew of the JOHN OWEN, lost on Lake Superior on Nov. 13, held registrations in the welfare plan of the Lake Carriers' association, their relatives or beneficiaries being entitled to a death benefit which has been paid. Since the inception of the welfare plan in 1909, the association has paid out in benefits, $52,298.95. Descriptions of the men who went down with the OWEN, as given in their welfare membership, have been sent to all coast-guard stations on Lake Superior in order that any bodies which may be washed ashore can be identified. Further, the Lake Carriers' association has

Digitized by Google

offered a reward of $25 for the recovery of the body of any member of the OWEN's crew.

* * *

The funeral of Mrs. Sarah E. Hunt, wife of Capt. William J. Hunt, took place in Lakewood on Nov. 28. Captain Hunt, who retired last season, is one of the best known vessel masters on the Great Lakes. He sailed steamers of the Pittsburgh fleet for a number of years, his last command being the D. M. CLEMSON.

* * *

During the heavy storm of Nov. 29, the upper guard gates of the Davis lock at the Soo were torn from their fastenings which put the lock out of commission for the balance of the season. As the Poe lock was damaged several weeks previously, the Fourth lock and the Canadian lock took care of all vessels until the close of navigation. It will be necessary to flood the Poe lock again to get out the big pontoon used for lifting the gates.

* * *

Capt. W. L. MacLean, master of the steamer CARL D. BRADLEY, recently reported a capsized scow in the channel of St. Clair river, below Tashmoo park. The scow is considered a dangerous obstruction to navigation.

* * *

The Canadian steamer GLENGARRY lost a big anchor near Mackinaw City and also ran aground on a sandbar near shore. The recent storm did not damage her as she was in a sheltered position.

* * *

Capt. William Williams, 66, retired master of Lehigh Valley Transportation line package freighters, died at his home in Buffalo, Dec. 7, after an illness of several months. Captain Williams began his career on the Great Lakes in 1865. He was master of the TUSCARORA for 25 years and of the WILKES BARRE for two years. He retired two years ago.

* * *

The tugs ALABAMA and IOWA and the lighter RELIANCE, which were sent to the wreck of the TIOGA ashore at Eagle river reef, have returned to the Soo.

Late News From Atlantic Seaboard

THIRTY-FOUR of the eagle boats from the Great Lakes have been ordered to the port of Portsmouth, N. H., and sailors from the battleship NEVADA and from Portsmouth have been detailed to go to the builder's yards at Detroit to serve as crews on the new vessels. Many of these boats have already arrived at the eastern port and an attempt will be made to get as many as possible of the others out through the St. Lawrence river before the ice interferes.

* * *

The Texas Shipbuilding Co., Bath, Me., has two large steel tankers near completion.

* * *

The Bath Iron Works, Bath, Me., has three destroyers on its ways, with the keel laid for a fourth vessel which will be a large cargo carrier.

* * *

The Canadian Steamship Co. has purchased from the United States government the steamer SHOSHONE, 9000 tons. The vessel was built in Germany in 1913.

* * *

The old shipbuilding yards of Cushings & Briggs at Freeport, Me., will be re-equipped and again put into the service of building ships, by the Northeastern Shipbuilding & Transportation Co. Oil-burning vessels of standard type from 1600 to 2000 tons each will constitute the main work at the rehabilitated yard.

* * *

The state of Maine recently bought of the city of New London, Conn., the ferry boat NATHAN HALE for $60,000. On account of the opening of the new highway bridge from New London to Groton, Conn., the city will have no further use for this ferry.

* * *

Lieut. Com. James Chatham Cress, in charge of the hydrographic office of the naval district, Boston, died of heart failure recently.

* * *

The steamship LAKE GATHER, 4050 tons, has been allocated by the United States shipping board to the port of Providence, R. I., for sailing from Providence, to Manchester, England, under the Laurance Co.'s direction.

* * *

The Bethlehem Shipbuilding Corp. has recently launched its thirtieth destroyer under government contract. This last vessel was named FLUSSER, after Lieut. Chas. W. Flusser.

* * *

The Texas Steamship Co., Bath, Me., recently launched the ARYAN, a 431-foot steel tanker. This is the twenty-second vessel to be constructed at the Texas company's Bath yards. She is 56 feet beam with a depth of 32 feet. Her hull is divided by steel transverse bulkheads and a steel center line bulkhead. Sixteen compartments are provided to be used as cargo tanks. Her engines will develop 3100 horsepower. Steam will be supplied by watertube boilers equipped for burning oil. Total capacity of her cargo tanks is 3,215,688 gallons.

* * *

The 3-mast schooner HORACE E. MUNROE recently launched by the Bangor Brewer Shipbuilding Co., Brewer, Me., will be used in the offshore trade, with Boston as her home port.

* * *

The shipbuilding yard of Dunn & Elliott Co., Thomaston, Conn., has just launched its fifty-fourth vessel, the barkentine REINE MARIE STUART. Her gross tonnage is 1263, and her overall length 220 feet.

* * *

The Grand Trunk railway announces that vessels of 10 regular transatlantic lines will sail from Portland, Me., when the season opens next spring. The White Star Dominion line will have two sailings for Liverpool and two sailings for Avonmouth. The Cunard line will have one sailing to London. The Anchor-Donaldson line will have two sailings to Glasgow, and the Furness line will have two sailings for Hull. The Thompson line will have one sailing to Leith.

* * *

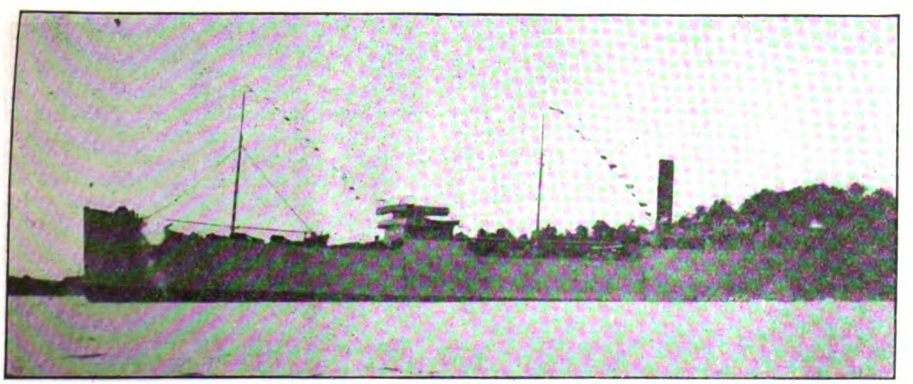
Miles M. Murray, well known master shipbuilder among Maine yards, died recently. Mr. Murray worked in many of the wood shipbuilding yards of Maine and for 20 years was with the Percy & Small yard, Bath, Me. He had 175 vessels to his credit and an exceptionally wide acquaintance among ship owners and seafaring men.

* * *

The steamboat MERRIMAC for more than half a century an excursion boat on the Merrimac river has just been dismantled and broken up at Newburyport, Mass.

* * *

The steamer CLARKSBURG, launched recently at the Downey Shipbuilding



OIL TANKER ARYAN JUST AFTER SHE TOOK THE WATER AT BATH, ME.

Digitized by Google

yards, Staten Island, N. Y., has entered the service of the Coastwise Transportation Co., Boston. The new vessel has a capacity of 7800 tons of cargo.

* * *

The 4-mast schooner VALMER L. HAMLIN built at the yards of the Frye Flynn Co., Harrington, Me., has entered the service of the Atlantic Coast Co., Boston. The new boat has a capacity of 1860 tons of cargo and will be commanded by Capt. John Sweeney, Everett, Mass.

* * *

The navy department has set aside Lockwoods basin and several adjacent buildings as headquarters for the United States naval reserve force in the Boston district.

* * *

Submarine S-5 was recently launched at the navy yard, Portsmouth, N. H. The new boat is 231 feet long, has a displacement of 870 tons and will be commanded by Lieut. Com. C. N. Cook.

* * *

According to advices from Washington, the Squantum shipbuilding plant, Squantum, Mass., is being considered as a base for all torpedo boat destroyers of the Atlantic fleet. Plans are also being considered for the navy department to take over the plant and operate it as a navy yard.

Orders Large Tankers

THE Standard Oil Co. is understood to have ordered two tank steamers of 20,500 deadweight tons each which will be the largest bulk oil carriers afloat. The vessels will cost approximately $3,500,000 *each and will have carrying capacity for* 140,000 *barrels of liquid fuel. Other additions to the tank steamer fleet of the Standard Oil Co. and its subsidiaries, for which contracts have been placed, will be five vessels of* 10,000 *tons and six vessels of* 7500 *tons. Recent estimates made by the tank executive of the United States shipping board of the fuel requirements of the United States for* 1920 *place the total at* 66,000,000 *barrels.*

* * *

North coast mariners have asked that the middle ground buoy at Vineyard sound be moved to a more advantageous point.

* * *

The American Ship Windlass Co.'s plant, Providence, R. I., has been sold to a fabric manufacturing concern and in consequence the old line of windlasses will be discontinued.

* * *

Silas E. Hartham, inventor and well known in New England shipbuilding circles, died recently at Worcester, Mass. When he was 17 years old, he built a steel boat 21 feet long, equipped with an engine and boiler of his own make. Since that time he had taken an active part in the construction of over 50 steamboats. He built the first two steamers placed on Lake Quinsigamond, near Worcester, Mass., in 1863.

* * *

The Peaked hill gas and whistling buoy off Cape Cod has been sunk by collision with a vessel. Its absence is causing considerable annoyance to navigators.

Activities Along the Gulf Coast

THE program of the board of commissioners of the port of New Orleans for 1920, includes the expenditure of some $14,500,000 in improving the harbor. The board plans to employ $5,000,000 in improvement of wharves, construction of new wharves and betterment of port facilities; $7,500,000 on the completion of the Industrial canal, and $2,000,000 in ratproofing the existing wharves, wharf approaches, landings, etc.

* * *

New Orleans has been put back on a prewar basis by the Southern Pacific Steamship Co. in the operation of its Morgan line steamers. The three passenger-carrying ships, COMUS, MOMUS and CREOLE are leaving New Orleans for New York every Wednesday, while the freighters EL MAR, EL FIA and EL MONTE are sailing every Saturday. This service was discontinued during the war, when most of these boats were taken over by the government for transatlantic service.

* * *

The big ship repair plant recently established at New Orleans by the interests of which Ernest Lee Jahncke is the head has obtained an 8000-ton drydock from the United States shipping board, which the board was having built at Beaumont, Tex. This gives the Jahncke plant a total drydock lifting power of 20,000 tons, as the corporation had just completed construction of a 12,000-ton sectional drydock at the repair plant in New Orleans. The new 8000-ton dock was towed to New Orleans from the Texas port. It was designed by the Crandall Engineering Co., Boston, and is in six compartments, to be used in units of 2, 3, 4 or 6 pontoons, according to tonnage of vessels handled. The dock is electrically operated, as is also the drydock recently completed by the company.

* * *

The West Indies are to have an interisland steamship line of their own, according to J. A. Marques Jr., steamship broker, of Havana, who was in New Orleans recently. This line has been organized in the Cuban capital and will operate seven or eight steamers between the ports of the islands handling the sugar and tobacco crops, general merchandise and passengers. This system will greatly facilitate trade with the ports of the United States, inasmuch as it will collect the freight of virtually all the islands at Havana and obviate the necessity of American ships calling at all these separate ports. Rafael Doniphan, Havana, is director of the new line.

* * *

A high lift lock, located near Sanders' Shoals, in the Warrior river, Ala., so as to create navigable channels in the Sipsey and Mulberry forks of that stream for distance of 24 and 30 miles, respectively, is to be recommended by federal engineers now making a survey of the streams, according to H. B. Battle, assistant United States engineer in charge of rivers. The opening of these streams to navigation will also open one of the largest coal mining regions in the South, and place it in direct water connection with Mobile, Ala., New Orleans and other gulf coast ports.

* * *

Five more all-steel 2000-ton barges have been received by the government barge service for use on the Mississippi river. These are the first of 25 of these craft which are being built by the American Bridge Co., Pittsburgh. They were towed down the river to St. Louis by the towboat HULINGS, under command of Captain H. B. Hulings, and were loaded in St. Louis for the voyage to New Orleans and way ports.

* * *

Fred H. Wood, Washington attorney for the Southern Pacific Co., has applied to the interstate commerce commission to grant the privilege of calling at Beaumont, Tex., to the Southern Pacific steamers (Morgan line). In May, 1917, the commission allowed the Morgan line to operate under the ownership of the Southern Pacific, but this operation was limited to the ports of New York, New Orleans and Galveston, Tex. Cargoes both ways now being assured in the Beaumont service, the Morgan line is trying to get into that port.

* * *

The steamer THOMAS L. WAND, which cleared from New Orleans Oct. 26, in ballast, became waterlogged 100 miles off South pass, in November, but her crew, with her captain, H. P. Palmgren, was rescued by the steamer OMOA and brought to New Orleans, the WAND being towed to Galveston, Tex.

* * *

The New Orleans levee board is having plans drawn for the construction of a lock on Bayou St. John where it enters Lake Ponchartrain within the limits of the Crescent City. This lock will regulate the tide waters of the lake on this much used bayou, and will render unnecessary some 12 miles of levee along the bayou, the upkeep of

Digitized by Google

which per year is almost as much as the original cost of the lock.

* * *

The three-mast schooner ANNIE LORD, Capt. Charles Nelson, given up for lost in the September hurricane, has been reported safe at Las Palmas, Canary islands, after an 89-day voyage from Mobile, Ala., where she is owned and operated by the Whitley-Bodden Co.

* * *

The American schooner DIRIA, 1364 tons, loaded with manganese from Cuban ports to Baltimore, foundered and was lost off Guantanamo, Cuba, Oct. 15, according to Capt. I. Halvarsen, of the steamer LAKE CHAMPLAIN which arrived in New Orleans late in November. Captain Halvarsen rescued the crew of the DIRIA and put them ashore at Guantanamo, but was unable to save the schooner, though he towed her two days until she sank.

* * *

Damage estimated at $100,000 was done to the cargo of hides and sugar of the Pacific mail steamer SAN JUAN, beached in the harbor of San Cristobal, C. Z., recently, by water which entered through a hole stove in the bow by one of the anchors.

* * *

The American steamer BENVOLA, from Port Arthur, Tex., for Montevideo and Rio with a cargo of case oil is stranded on the coast of British Guiana, and is a total wreck, having been abandoned by the crew, according to advices reaching New Orleans shipping interests. The BENVOLA was a wooden steamer of 3500 tons, built in 1919 at Astoria, Oreg., and owned by the United States shipping board.

Up and Down the Pacific Coast

EXPANSION of Puget sound commerce to include regular service to Mexican and Central American ports has been a feature of November. With the sailing of the motorship LIBBY MAINE from Seattle recently, the Pan-Pacific Co. started trade connections with the West Coast and now the Pacific Steamship Co. has announced that it will resume regular sailings to Mexican ports with the steamships CURACAO and SENATOR. The latter company formerly plied to Mexico but the service was withdrawn several years ago because of the unsettled conditions in the southern republic.

* * *

Bringing silk valued in Japan at $9,789,750, the Nippon Yusen Kaisha's express liner SUWA MARU crossed the Pacific to Seattle. At point of shipment silk is now valued at $2250 per bale but in this country its value is greatly enhanced. This is said to be the second most valuable shipment of silk ever to cross the Pacific.

* * *

The high cost of living is one of the problems facing the steamship companies on the north Pacific. For instance, the Pacific Steamship Co., in its various routes, serves more than 200,000 meals per month to between 25,000 and 30,000 persons, including passengers and crews. This item is said to be almost as heavy an expense as that of fuel oil, which is one of the most serious matters now confronting operators.

* * *

With the shipping board offering 3500-ton wooden hulls for $75,000 and machinery and equipment at reasonable figures, some of the surplus wooden tonnage built during the war emergency is beginning to be sold. Several hulls have recently been purchased by private interests while the Alaska Engineering Co. has bought a wooden hull for use as a barge. E. S. Hough, marine architect, designer of the Hough type, has just purchased the wooden hull ARCTURUS, of his own design. This vessel was built at the McEachern yards at Astoria, Oreg., and will be completed as a steamship. With hulls selling at $75,000 flat, it is estimated that sailing vessels of from 3500 to 4000 deadweight tons can be delivered complete at around $175,000 and steamships of the same size for about $225,000. Under present conditions, shipping men do not consider this excessive.

* * *

Until working conditions are changed and all outside interference by union leaders is eliminated, the Todd shipyards at Tacoma, Wash., will remain closed. This ultimatum has been delivered to the employes of that yard who have been idle for two months. This is the decision of the Todd management and no deviation from it has resulted, notwithstanding pressure brought to bear both from citizens of Tacoma and union leaders. The company is willing to pay the Macy wage scale but it has refused the additional 8 cents an hour granted by some other steel yards. There is enough work on hand to last two and a half years under the Macy scale, the men have been told.

* * *

David Rodgers, master shipbuilder, formerly with the Skinner & Eddy Corp., Seattle, has been seriously ill and now must give up all business cares for six months, according to his physician. Mr. Rodgers has been negotiating with British and Canadian interests for large steel contracts and it has been reported that some of this work was to come to Seattle. As general manager of the Skinner & Eddy plants, Mr. Rodgers worked unceasingly and this strain made serious inroads upon his health. He recently returned to his home after a stay in the hospital.

* * *

The Todd drydocks, Seattle, have been constantly busy recently having had several repair and overhauling jobs on hand. This yard docked and repaired the shipping board steamship WESTERN GLEN, which was damaged by being ashore in Japanese waters. The Grace line steamers SANTA ALICIA and SANTA INEZ and the schooner W. J. PIRRIE, of the same fleet, were recently docked and cleaned while the Norwegian steamship BAJA CALIFORNIA underwent docking and overhauling. The steel steamer GAFFNEY is now completing at this plant and will shortly be in service.

* * *

With the launching of the steel steamer CROSS KEYS Nov. 22, the Skinner & Eddy Corp. has floated 65 steel vessels for the shipping board, eight of which, however, had been undertaken on private contract prior to the United States entering the war. The CROSS KEYS was the fifty-seventh direct and last contract for the shipping board. This vessel was built at plant No. 2, formerly the yard of the Seattle Construction & Dry Dock Co., the oldest steel plant in the Pacific northwest. The completion of this vessel marks the cessation of work at this yard.

* * *

With the steel freighters JUNEAU and VALDEZ, the Alaska Steamship Co., Seattle, has inaugurated a new regular service between Seattle and Baltimore, via San Francisco, San Pedro and Panama. Both vessels are now in the Atlantic but they will at once begin operations on the coast-to-coast service. The VALDEZ and JUNEAU were built on the Great Lakes, being purchased by their present owners in 1915 as the BENNINGTON and BURLINGTON respectively. They have since operated in the Alaska trade and more recently were chartered for service between South America and Atlantic ports.

Sues for War Loss

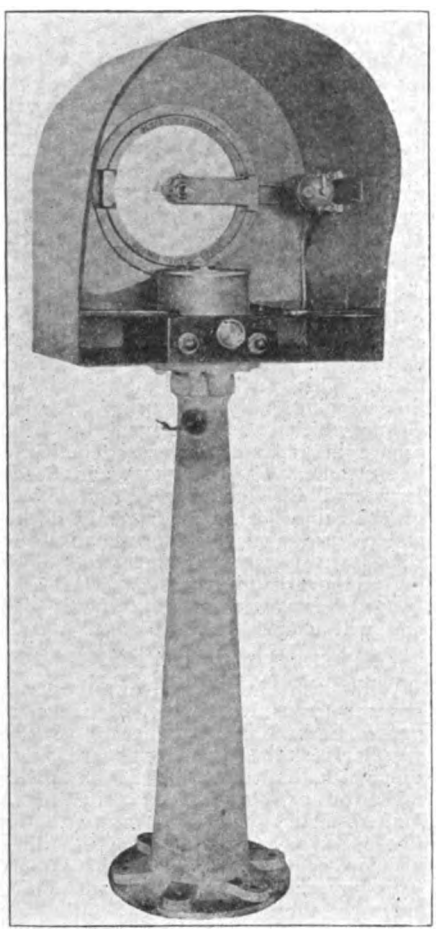
AN echo of the pirating operations of the German raider WOLF *in the south Pacific comes in the nature of a suit filed by H. L. Richardson, Hoquiam, Wash., first officer of the American schooner* ENCORE *which was captured and burned by the* WOLF *in July,* 1917. *Richardson has instituted legal action to recover* $4308 *from the German government. The sum asked is the alleged value of charts, clothing, books and jewelry which the Germans refused to return and also for wages he would have earned during the* 19 *months he was held prisoner. The papers have been forwarded to the state department and the outcome will be of interest to all mariners.*

Digitized by Google

Equipment Used Afloat, Ashore

Clear View Screen—Dynamic Balancing Machine—Ship Propellers—Starting Switch—Boiler Feed Pump—Whistle Operator—Boat Davit—Stockless Anchor

ANY ship's officer realizes that the chief difficulty pertaining to the use of binoculars at sea during stormy weather is that they are almost entirely useless behind a window, due to the rain running down the pane. Used in the open, they are quickly rendered useless by rain and spray that settles on the lenses. To obviate this difficulty, the Chadburn (Ship) Telegraph Co. of America, Inc., Troy, N. Y., recently developed the device shown in the accompanying illustration.



SHIPS' OBSERVATION SCREEN

Briefly described, this apparatus consists of a disk of glass, mounted on an axle running inside a metal frame, which is revolved by a small electric motor. The speed of the disk is sufficient to cause the centrifugal force to throw off rain, spray and snow as fast as it strikes. It is pointed out that the necessary speed to accomplish this end is not excessive. The disk gives a clear view circle of 11 inches and to prevent rain working in between the disk and its frame a moisture proof joint is utilized. It is said that no loss of light or definition can be detected from the intervention of the disk until an angle of 60 degrees on either side is reached.

The apparatus is made in two forms. In the first type, the mechanical unit comprising the disk, metal frame, electric motor and carrying bracket is mounted in a rectangular frame which is fixed in the place occupied by one of the wheel-house windows. This type of screen is generally supplied in a polished teakwood frame 22 inches wide x 16 inches high with an inner frame hinged so as to give access to the front side of the disk. The screen is also supplied in a special frame to fit existing windows.

In the second type, the apparatus is mounted in a special revolving hood which commands an all-around view and is suitable for use in any position on the open bridge, flying bridge, forecastle deck, etc. This type has been installed on a number of large British liners. The usual arrangement is to have two hoods fixed on either side of the bridge so as to command the entire horizon. With this type of screen, the hood forms a shelter for the observer. The hood rotates with the observer's movements and will face any point of the compass. This screen also contains a bearing indicator which automatically indicates the bearing of any object observed. A special feature, that is supplied on special order only, is a pelorus which takes the place of the bearing indicator.

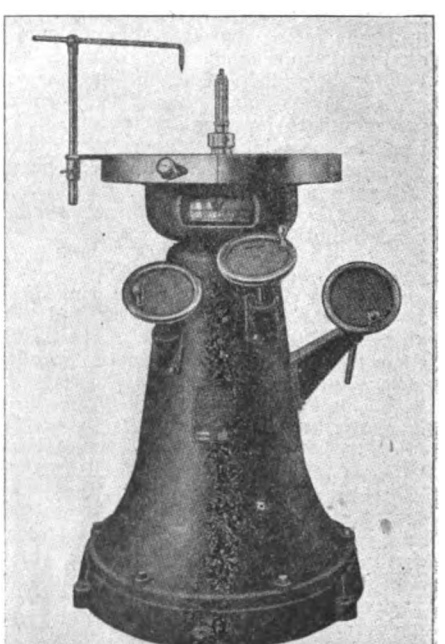
This device performs all the functions of an ordinary pelorus such as the taking of 4-point bearings, etc., and as the dial and sights as well as the observer are sheltered from the weather, readings can be easily taken in all sorts of weather. In the standard screen of this type, the height from the base of the pedestal to the under side of the hood is 41½ inches. The hood is 24 inches wide x 25¼ inches high. These screens have been successfully used on small as well as large craft. The smallest craft the Chadburn company has fitted is a 55-foot coast power boat while the largest vessel supplied with an outfit registers 46,000 tons. The usual arrangement on large ships is to have two on the hood screens, one on either side of the bridge, and a window screen in one of the navigation house windows.

Following are some of the liners that have been fitted with these screens: MAURETANIA, AQUITANIA, CENNANIA, ORDUNA, CARONIA, OLYMPIC, BALTIC, CEDRIC, CELTIC, ADRIATIC, BELGIC, MEGANTIC, EMPRESS OF FRANCE, LAPLAND, REGINA, SNOWDROP and REXMORE. Most of these vessels carry the hood and the window type screen.

Dynamic Balancing Machine

To insure quiet running, rotating parts should be carefully balanced. Otherwise vibration is bound to be in evidence. This applies to all revolving units that are run above normal speeds such as flywheels, gears, propellers, turbine rotors, etc. An expert workman can, of course, provided he is given plenty of time, balance almost any running part in the engine lathe. However, as he is guided by rule-of-thumb only, the results are gained at a high labor cost.

To permit the balancing of rotating parts quickly, the machine shown in the accompanying illustration recently was developed by the Crawford Tool & Mfg. Co., Chicago. This machine is designed to handle rotating parts which need not be in static balance. When the machine is set in motion, it indicates the amount of vibration that is present. Then by means of tables which accompany the machine, the correct amount of metal to remove from the heavy side is readily ascertained. The operation of the machine is com-

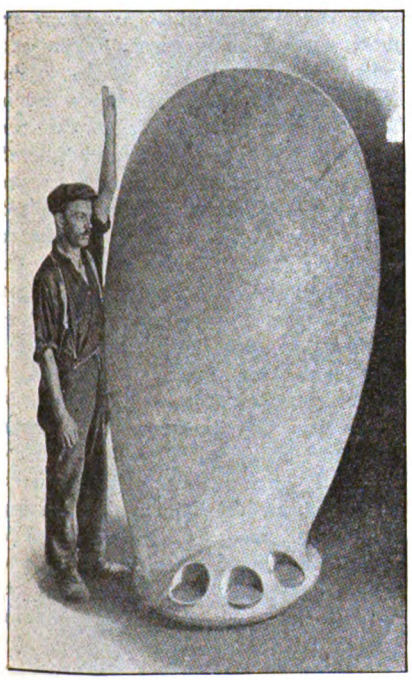


MACHINE FOR BALANCING ROTATING PARTS

Digitized by Google

paratively simple. The operator puts the part to be balanced on the spindle and locks it securely in place. The machine is then started at low speed and if the indicator does not show a vibration exceeding 10 points the speed is increased. Then by manipulating the hand wheels at the front of the machine, the part is brought into balance. This is accomplished by throwing the spindle off center. The amount to remove from the part to bring it in balance is easily found. Thus after the heavy side has been lightened, as for instance by drilling, the part is tested again.

It is said that the machine is simple to operate and that with a little experience an ordinary operator can bring the piece to be tested into dynamic balance within eight seconds. A chart that accompanies the machine gives the number and depth of holes to drill to remove metal in balancing.



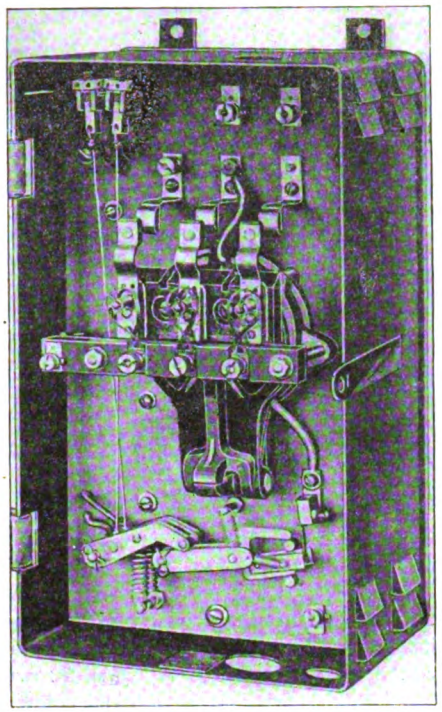
LARGE BRONZE PROPELLER BLADE

Large Ship Propellers

The Columbian Bronze Corp., New York, manufacturer of ship propellers, has recently designed a line of standardized motorship propellers. These are said to be true screw and accurate to pitch and in their design stream line efficiency and resistance to rotation has been given special attention. These propellers range from 50 to 96 inches in diameter, with two, three or four blades.

Thec ompany recently completed construction of 56 manganese bronze, sectional propeller blades for the Oscar Daniels Co., New York; two 17½-foot sectional bronze propellers for the Canadian Vickers, Ltd., Montreal; and 48 manganese bronze propeller blades of sectional type for the Hardie-Tynes Mfg. Co., Birmingham, Ala. The company is also manufacturing a number of repair blades for the Standard Oil Co., to be installed on its ships.

The average weight of the blades for the Hardie-Tynes company is 3200 pounds, for the Daniels company 3800 pounds and for the Canadian Vickers 4700 pounds. The accompanying illustration shows one of the Columbian company's propeller blades of the built-up type.



COMPACT MOTOR STARTING SWITCH, COVER REMOVED

Starting Switch

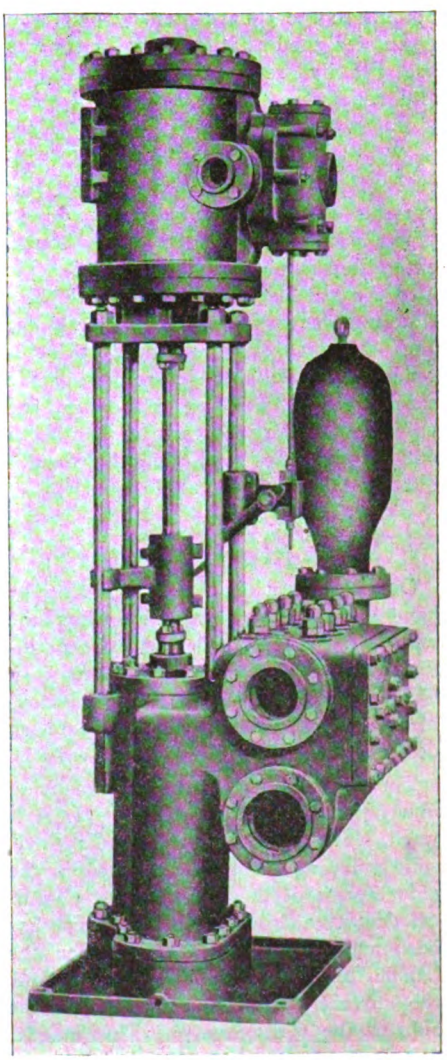
For starting small motors by connecting them directly to the power circuit, the Electric Controller & Mfg. Co., Cleveland, recently developed the switch shown in the accompanying illustration. This device takes the place of the ordinary knife switch generally used for this purpose. It is operated by means of push buttons which are arranged for conduit connection.

The principle involved in this switch is new in motor starting practice. The two wires shown at the left give overload protection of the inverse time element type, both while the motor is starting and while it is running. These two wires are stretched to a predetermined tension so that the operating value of this overload protection is adjustable by changing the tension of the wires. If too much current is being taken by the motor, the wires expand which causes the small contact at the bottom to open. This, in turn, de-energizes the magnet coil which cuts the motor off the power line. Then it is necessary to push the start button before the motor can again be started.

It is pointed out that this principle is the same as used in ammeters and that it gives a satisfactory overload protection together with an inverse time feature. The device is said to be simple in construction. The parts are mounted on a slate which is enclosed in a metal casing. In operation the current is closed by pushing a button marked "start" while the "stop" button opens the circuit when it is desired to stop the motor.

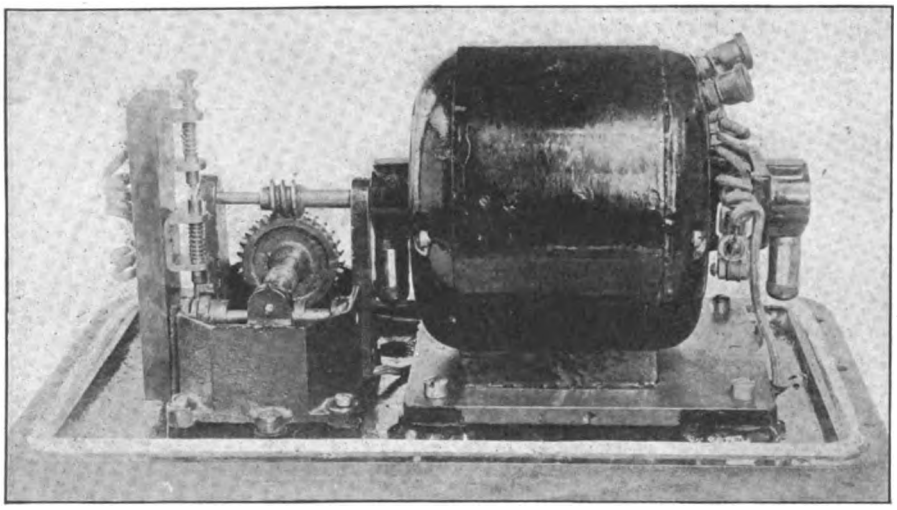
Boiler Feed Pump

A pump designed for marine boiler feed service by the Union Steam Pump Co., Battle Creek, Mich., is shown in the accompanying illustration. It is a self-contained unit mounted on a substantial base, wherein the water end at the bottom is con-



VERTICAL BOILER FEED PUMP

Digitized by Google



SELF-CONTAINED WHISTLE BLOWING UNIT WITH COVER REMOVED TO SHOW DETAILS

nected to the steam end at the top through the medium of four steel stanchions.

The pump and piston rods are separate, both being keyed into the crosshead. The crosshead also actuates the steam valve gear. The pump is designed for a maximum steam and water pressure of 300 pounds to the square inch. The pump is so designed that all working parts are readily reached for adjustment and repairs.

The valves in the water end are bronze, of the flat disk type. The valve seats also are bronze and are pressed into the valve decks on a taper. The valve bolts are bronze, extending through the discharge seats into the suction seats. If it is desired to obtain access to the valves, either the suction or discharge, this is readily accomplished by removing the side plate. Then by removing the valve bolt, the valves can be taken out through the hand plate hole without disturbing the valve seats.

Whistle Operator

Operating a whistle aboard a ship by hand during foggy weather, when the whistle must be sounded at frequent intervals, is a tiresome operation at best. This condition has led to the development of automatic whistle operating devices.

The device shown in the accompanying illustration was developed by J. J. Aylward, New York. It consists of a valve, slide valve and magnets, as used in the older forms of these outfits, but a radical departure from the older design has been made in its operation. When the handle of the switch is thrown "on" the current energizes a magnet on the side of the whistle valve. This magnet releases an exhaust which allows the steam which has held the valve closed to escape. When the switch is placed at the "off" position, the steam in the pipe instantly closes the valve and keeps it closed until the switch is again thrown "on." This arrangement, it is pointed out, reduces the number of working parts of the valve and at the same time permits of heavier construction.

When the handle of the switch is brought to the extreme left or "automatic" position, a small slow running motor is started. This motor makes as many contacts as may be necessary for blowing the whistle during fogs. The whistle will operate automatically until the switch is moved.

It is said that many years of experience with whistle operators has proved that a small motor for operation gives satisfactory results. These motors, being geared, develop considerable power while the contact is a clean make-and-break. The motor is installed in a waterproof box, the cover of which is removed in the accompanying illustration. It can be located in the wheel house or on the bridge. It is noiseless in operation and takes up a space 10 x 10 x 16 inches. This device is in use on both Great Lakes and ocean going vessels.

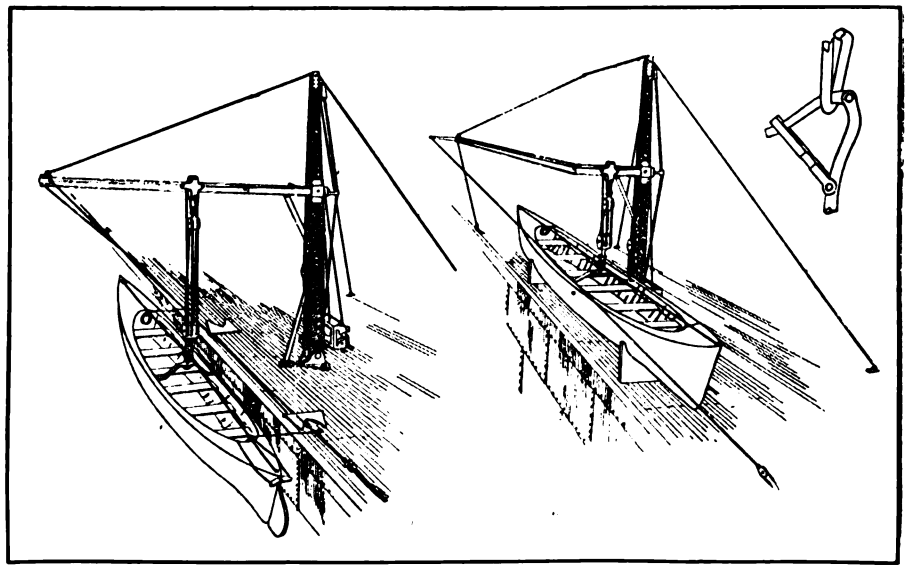
Boat Davit

The device shown in the accompanying illustration is a boat lowering apparatus designed to assure a maximum amount of safety in launching. It was designed by O. T. Henderson, Chicago, and is covered by patent. The inventor points out that the boat is automatically lifted off the deck, carried out a safe distance from the vessel's side and, on touching the water, is automatically released from the davit.

The illustrations show the construction details. The upright pillar carries a horizontal arm which is jointed, the outer portion being turned inboard and lashed securely by guys leading to the deck. The boat rests in chocks and is held by four gripe lashings. The rope by which the boat is lowered is fastened at the outer end of the boom and passes over a pulley, then to the tackle and from thence to a drum at the base of the davit. A brake operating on the drum through the medium of a hand wheel allows the rope to be paid out gradually as the boat is lowered.

In actual use, the man in charge of lowering the craft takes his position at the davit and pulls a lever that releases the four lashings. These lashings are provided with automatic latches which act in unison. The boom then is swung outboard by means of its lashings. This action shortens the rope sufficiently to raise the lifeboat slightly and the chocks fall to the deck or are pushed over easily.

Release of tension on the brake lets the boat start downward and its own



LIFE BOAT DESIGNED FOR SAFE LAUNCHING—THIS DEVICE RELEASES AUTOMATICALLY WHEN THE BOAT TAKES THE WATER

Digitized by Google

weight acting on the rope causes the trolley to proceed outward on the boom until the end is reached. This movement is always under control by a cable from the trolley to an auxiliary drum and brake. As soon as the weight is removed from the suspension rope, the automatic latch opens and releases the boat from connection with the ship.

All operations except swinging the boom into position are performed by one man, placed at the foot of the davit. To prevent the boat from pitching by the bow or stern, since it is handled by one tackle, a cable running from stem to stern is connected rigidly at the center as high as possible on the suspending tackle, just under the automatic latch. This, it is pointed out, gives a double suspension point carrying both ends equally.

Stockless Anchor

The anchor shown in the accompanying illustration is of open hearth cast steel, made by the Admiral Anchor Co., Philadelphia. It is furnished in several sizes up to 30,000 pounds. It comprises five parts, fluke, fluke pin, shank, shackle pin and shackle. All parts have a tensile strength of 60,000 to 70,000 pounds to the square inch, elastic limit of 45 per cent of the tensile strength, elongation of 15 to 25 per cent and 20 to 30 per cent reduction of area by tests.

FIVE-PART CAST STEEL ANCHOR

The anchors are assembled by drawing the shank through the opening in the fluke, forcing the fluke pin through the cored hole in the fluke and shank and upsetting the end of the fluke pin. The shackle and pin are placed in position, the pin ends upset and the assembly is complete. These figures are the result of recent tests.

It is pointed out that this anchor takes hold simultaneously with both flukes and that it will not roll. It is also said that it will not break mud while enternig, due to the fact that the flukes are parallel to the shank so that a straight pull is made. Its design also permits it to house close to the vessel's side in the hawse pipe. Each part of the anchor is more than twice as strong as the cable for which it is intended. The Admiral company draws attention to the fact that its anchors have been approved and accepted by the American bureau of shipping, bureau Veritas and Lloyd's, after exhaustive tests.

Business News for the Marine Trade

The International Freighting Corp., New York, has increased its capital from $100,000 to $200,000.

The Redondo Steamship Co., New York, has increased its capital from $500,000 to $625,000.

Capitalized at $500,000 the Merrymount Steamship Corp., Kennebec, Me., has been organized to build and operate steamships.

The Namaug Steamship Corp., Augusta, Me., has been organized with $500,000 capital to engage in all branches of the shipbuilding business.

The Tollard Steamship Corp., Augusta, Me., recently was chartered with $500,000 capital to engage in a general steamship business.

Harry Babaian, Lynn, Mass., and others have incorporated the American Steamship Co., Boston. The company is capitalized at $100,000.

Plans are being considered by the Charlestown navy yard, Charlestown, Mass., to again take up the manufacture of wire rope.

The Boston Maritime Corp., Kittery, Me., recently was incorporated with $2,000,000 capital to engage in shipbuilding in all its branches.

Fire recently damaged the plant of the Delaware Ship & Repair Co., Camden, N. J. The loss was estimated at $100,000.

Capitalized at $500,000, the Worcester Steamship Corp., Augusta, Me., recently was incorporated to engage in the steamship business.

Capitalized at $100,000, the Marine Wrecking & Lumber Co., 355 Fifteenth street, Hoboken, N. J., recently was incorporated.

An increase in capital from $15,000 to $50,000, recently was made by the Sullivan Towing & Transportation Co., New York.

The American Mast & Spar Corp., New York, recently increased its capital from $50,000 to $75,000.

The Boston Merchant Marine Sealing Co. has been organized with $25,000 capital, by John J. Collins, William F. Collins and others, to engage in the vessel repair business at Boston.

Announcement has been made by the Penn Seaboard Steel Corp., to the effect the Admiral Anchor Co., 111 Broadway, New York, has been appointed selling agent for its stockless anchors, etc.

Andre G. Lockwood and others, Saginaw, Mich., have purchased the plant of the Brooks Boat Co. for $100,000, and will remodel it for the manufacture of truck bodies.

The N. D. Cobb Co., Inc., Portland, Me., has been incorporated with $100,000 capital to build boats and manufacture marine hardware, by N. D. Cobb, V. M. Cobb and Harry L. Cram.

Capitalized at $50,000, the Standard Ship Repair Co., New York, recently was incorporated by S. M. Louis, T. M. Constable and F. J. Nolan, 216 President street, Brooklyn, N. Y.

The Lloyd Italo American Steamship Co. has been chartered in Delaware with $1,000,000 capital, by Gabriel Stahle, Somerville, Mass., Joseph Pistorino, Luigi McColai, New York, and Domininco Pace, West Medford, Mass., Michael Lyunes, Chelsea, Mass., Brooklyn, N. Y.

The Mexican Petroleum Co. has ordered a fleet of six tank steamships of 10,600 tons capacity each. It is estimated the vessels will be built at a cost of $12,500,000.

The Columbus Steamship Co. recently was chartered in Delaware with $500,000 capital, by T. L. Croteau, P. B. Drew and H. E. Knox, of Wilmington, Del.

T. L. Croteau, P. B. Drew and H. E. Knox, Wilmington, Del., have been named as the incorporators of the Magellan Steamship Corp., which was recently chartered in Delaware with $2,600,000 capital.

The Lonetur Steamship Co., Brooklyn, N. Y., has been incorporated with $100,000 capital, by C. Maddlom, D. K. Turner and H. Swanson, 946 Fourth avenue.

The National Marine Compositions Co., New York, ship and boat painting, has been incorporated with $10,000 capital, by L. Rovera, W. C. Lacombe and C. Holdenjer, 42 Broadway, New York.

To build, operate and own vessels of all kinds will be the business engaged in by the States Steamship Corp., Wilmington, Del., which was recently incorporated with $500,000 capital.

Capitalized at $500,000, the Inter-Ocean Shipbuilding Co. recently was incorporated in Delaware by M. M. Lucy, M. B. Butler and B. M. Marrett, Wilmington, Del.

Philip De Rondo, Frank H. Hall, and Henry V. Julier, New York, have been named as the incorporators of the Orient Steamship Corp., which was recently incorporated in Delaware with $1,750,000 capital.

The Tampa-St. Petersburg Transportation Co. has been incorporated in Delaware with $200,000 capital, by S. F. Townsend, G. H. Reed and M. M. Toner, Wilmington, Del.

The National Oil Transport Co., Portland, Me., has been incorporated with $1,000,000 capital, to build, operate, charter, etc., barges, ships, boats of all

New Offices

The Kerr Steamship Co. announces that it will open an office in San Francisco with Victor M. Smith as general agent.

T. J. Burton and J. J. Hillgardner have formed a copartnership firm and will conduct business under the name of Burton & Hillgardner. Offices have been established at 17 State street, New York, where a freight brokerage and forwarding business will be conducted.

The Cunard, Anchor and Anchor Donaldson lines have opened a branch office in Atlanta, Ga., at 55 Forsyth street. The office is under the management of J. E. Miller.

The Black & Decker Mfg. Co., Baltimore, has opened an office at 201 Maryland building, Seattle, in charge of A. E. Nordwall.

The general offices of the Black & Decker Mfg. Co. have been removed to 105 South Calvert street, Baltimore, to Townsen Heights, Baltimore.

Digitized by Google

kinds to do a marine transportation business and all things incident.

The Port Elizabeth Navigation Co.p. recently was incorporated in Delaware with $512,500 capital, by O. D. Duncan, Montclair, N. J., John A. McManus and Warner C. Pyne.

The Stone-Richardson Corp., New York, transportation and navigation, has been incorporated with $200,000 capital, by T. H. Ledger, L. Richardson and H. L. Stone, 70 Fifth avenue, New York.

To build and operate boats, etc., the Astamahoo Navigation Co., Inc., recently was incorporated in Delaware with $500,000 capital, by T. L. Croteau, H. E. Knox and S. E. Dill, Wilmington, Del.

The Pioneer Steamship Corp. recently was incorporated in Delaware with $16,000,000 capital to operate vessels, by T. L. Croteau, H. E. Knox and S. E. Dill, Wilmington, Del.

With $250,000 active capital, the New York Oceanic Co., New York, transportation and navigation, has been incorporated by J. H. Torney, G. W. Clackner and C. G. Appleton, 3750 Broadway.

Capitalized at $20,000, the Neptune Ship Supply Co. recently was incorporated in New York, by S. J. Bethauer, S. and S. Kahn, 2051 Fifth avenue, New York.

Herbert S. Bain, Chestia F. Bloeck and James Downsey, all of New York, recently incorporated in Delaware, the Atlantic Marine & Construction Co., with $2,000,000 capital.

The Maritime Coaling Co. has purchased a large frontage and docks at East Boston, Mass., and plans to improve the property for the storage of oil. This is the third recent sale of the waterfront for additions to the oil business.

The shipbuilding plant known as the Shattuck shipping yard, Newington, and formerly owned by the United States Shipping board, has been sold to the Atlantic Chemical Dyestuffs Co., Burrage, Mass., and will no longer be utilized for the building of ships.

The Kennebec Navigation Co. has been organized at Bath, Me., with $200,000 capital, to engage in a general shipping business. The directors are Peter A. Olinka, Elwell S. Crosy and Walter S. Slidder, all of Bath, Me.

The Exeter Machine Works, Inc., 30 Church street, New York, recently received an order from the Emergency Fleet corporation, for ten 15-foot built-up and assembled bronze propellers including two spare blades with each assembled propeller.

Lewis R. Palmer, C. F. Westing and George C. Palmer have announced the opening of a business under the name of Palmer Bros. & Westing, iron and steel, brass and bronze products. Office of the firm is in the Stock Exchange building, Philadelphia.

The Bethlehem Shipbuilding Corp., Ltd., has let a contract to P. McGovern & Co., New York, for the erection of a 5000-ton floating drydock at its Fore River yards, Quincy, Mass., to be built at an estimated cost of $2,500,000.

The Dominion government recently appropriated $700,000 for the construction of the Courtnay Bay drydock at St. Johns, N. B. The St. John Drydock & Shipbuilding Co. has the contract for erecting the plant.

J. J. Slechta, W. L. Forck and A. J. Brothers, 2 Rector street, New York, are the incorporators of the Amercan Lloyd Transportation Co., New York, which was recently incorporated with $1,000,000 capital.

Papers of dissolution have been filed by the Argonaut Salvage Co., Bridgeport, Conn. The company was originally formed for the purpose of scouring the bottom of Long Island Sound for wrecks and was capitalized at $3,500,000. No reason for the dissolution of the company has been given.

The Ft. Morgan Steamship Co., Inc., New York, transportation, navigation, etc., recently was incorporated with $500,000 capital, by D. R. Lyons, 10 Cornelia street, G. Dencker, 281 East Twenty-first street, and J. A. Reilly, 391 Central Park West, New York.

The Albina Engine & Machine Works, Portland, Oreg., according to a report, will dismantle its shipbuilding plant and will resume its prewar work as a general machine and repair shop. The shipbuilding equipment, comprising a complete shop for the manufacture of marine engines and deck machinery, and a fabricating shop, will be placed on sale.

The Crowninshield Shipbuilding Co., Fall River, Mass., is prepared to resume work in the near future. It is reported that 500 workmen will be employed. The plant became idle at the expiration of government contracts for wooden ships. New machinery is being installed and repair work on a large scale will feature the new operations.

Important offshore and other expansion contemplated by the Pacific Steamship Co., San Francisco, entails an issue of 6 per cent preferred stock, to the extent of $25,000,000. This proposal together with other details of the expansion program, is to be laid before a meeting of the directors of the holding corporation, the Pacific-Alaska Navigation Co.

The Union Shipbuilding Co., Baltimore, will shortly begin the construction of a railway drydock, capable of drydocking vessels up to 4000 tons displacement. This dock will be constructed of wood, will measure 360 feet over the keel-blocks and will have a draft of 20 feet. The Crandall Engineering Co., drydock engineer, East Boston, Mass., is the designer of the docks, and will superintend the construction.

The Western Marine Railways, Ltd., has contracted to build two railway drydocks of wood construction at Burin, N. F. The larger will measure 170 feet over the keel blocks and will be capable of handling vessels up to 1000 tons displacement. The smaller will be capable of handling two vessels up to a displacement of 300 tons each. The Crandall Engineering Co., East Boston, Mass., will design and contruct these docks, construction of which will start in the spring.

New Trade Publications

DOCK CRANES.—The type of dock cranes recently installed at the United States army supply base, Boston, are fully illustrated and described in a pamphlet recently issued by the Wellman-Seaver-Morgan Co., Cleveland. It is pointed out that all the machinery is electrically driven and that the cranes represent the modern development of cargo handling machinery of this type. The pamphlet contains a full technical description of the cranes which were described in THE MARINE REVIEW, October, 1919.

ELECTRIC LIGHT PLANT.—The Buda Co., Chicago, has issued a booklet describing its electric lighting units. It describes a one and also a ½-kilowatt steam turbine generator for lighting small industrial plants and for use as marine installations. It is said that the entire plant occupies but little space and that its design has been made as simple as is consistent with economical results. The speed is controlled by an automatic governor while the field coils of the generator have a compound winding which keeps the voltage uniform.

BOILER BAFFLES.—The Betson Plastic Fire Brick Co., Inc., Rome, N. Y., is issuing a circular describing its boiler baffles. It is pointed out that different boilers require baffles of various angles and that the baffles should be gastight of the proper shape and slope to give uniform gas velocity so as to direct the furnace gases to all parts of the heating surfaces. It is said that the company's material used for making baffles takes up expansion and contraction and forms a satisfactory 1-piece baffle. Several illustrations are included showing how the baffles are installed.

BARGES.—An interesting, illustrated pamphlet describing barges for interior waterways has been issued by the Dravo Contracting Co., Pittsburgh. Several types of barges recently built by the company are described. It is pointed out that up to within 10 years ago wood was exclusively used in river barge construction but that at the present time excellent barges are being constructed of steel. While wooden barges are lower in first cost, it is stated that the upkeep of a steel barge is more economical. The pamphlet will prove interesting reading for naval architects and others interested in inland water transportation.

OIL ENGINES.—J. Samuel White & Co., Ltd., East Cowes, Isle of Wight, is circulating an illustrated booklet in which heavy oil engines are described and illustrated. These engines are manufactured by the company in two types and range in powers from 150 to 2000 brake horsepower. The heavy, slow running type is for mercantile-marine and land installations. The light type is for special service, including submarines. All marine engines are reversible and can be shifted from full ahead to full astern in a few seconds. The starting and reversing gears are simple and are readily manipulated. The full-speed revolutions can be reduced 1-3 in number for slow turning or cruising. Both types of engines work on the 2-cycle principle. The booklet contains a complete description of the engines, a number of halftone illustrations, and 10 line drawings, showing various parts of the engines.

MARINE GLUE.—L. W. Ferdinand & Co., Boston, have issued a catalog describing marine glue. This material is compounded in several forms to adapt it to dock and hull seams, backing for armor plates, coating the interior of battery boxes, covering boats and decks with canvas, waterproofing tanks for ammonia pipes and general insulation purposes, for making hollow spars, waterproof liquid glue for attaching canvas to wood, etc., and a special canoe glue for repairing and canvasing canoes. The catalog contains much technical information regarding the use of these products. It sets forth just how to melt and apply the glue to get the most satisfactory results, how to caulk and pay deck seams, methods of joining timbers, etc.

DROP FORGINGS.—J. H. Williams & Co., Brooklyn, N. Y., are issuing the seventeenth edition of their catalog which describes drop forged products. These include wrenches of various kinds, spanners, turning tool holders, boring tool holders, tool post fittings, lathe dogs, C-clamps, lathe and planer straps, parallel clamps, caliper gage forgings, eye bolts, swivels, hoist hooks, wire rope sockets, thumb nuts and screws, crank handles, pipe tools, crankshaft forgings, connecting-rod forgings, etc. There is also included an interesting, illustrated treatise on drop forgings, tracing the origin and gradual development of the drop-forge process. The several types of presses used are described while die sinking, trimming presses, carbonizing and case hardening, heat treating and inspection are fully described. The catalog points out that the company has developed an entirely new line of set screw pattern tool holders.

ELECTRICALLY DRIVEN UNITS.—The Black & Decker Mfg. Co., Baltimore, has issued an attractive, illustrated catalog describing electric air compressors, portable electric drills and electric valve grinders. The electric air compressor is a self-contained unit designed to furnish 2 cubic feet of free air per minute at a pressure of 150 pounds. This compressor is driven by a ½-horsepower motor which is connected to the crankshaft through the medium of gearing. A phantom illustration shows the working parts of this device. The electric drill motor is of the multiple pole type wherein the armature and field are built up of insulated sheet steel laminations. This unit is series compensated wound and will operate on direct current or on 25, 40 or 60-cycle alternating current or on any two wires of a 3-phase circuit. It is pointed out that the motor will operate satisfactorily on voltages 10 per cent over or under the circuits for which they are designed. The electric valve grinder is a modification of an electric drill designed to replace hand methods used in grinding in poppet valves.

Digitized by Google